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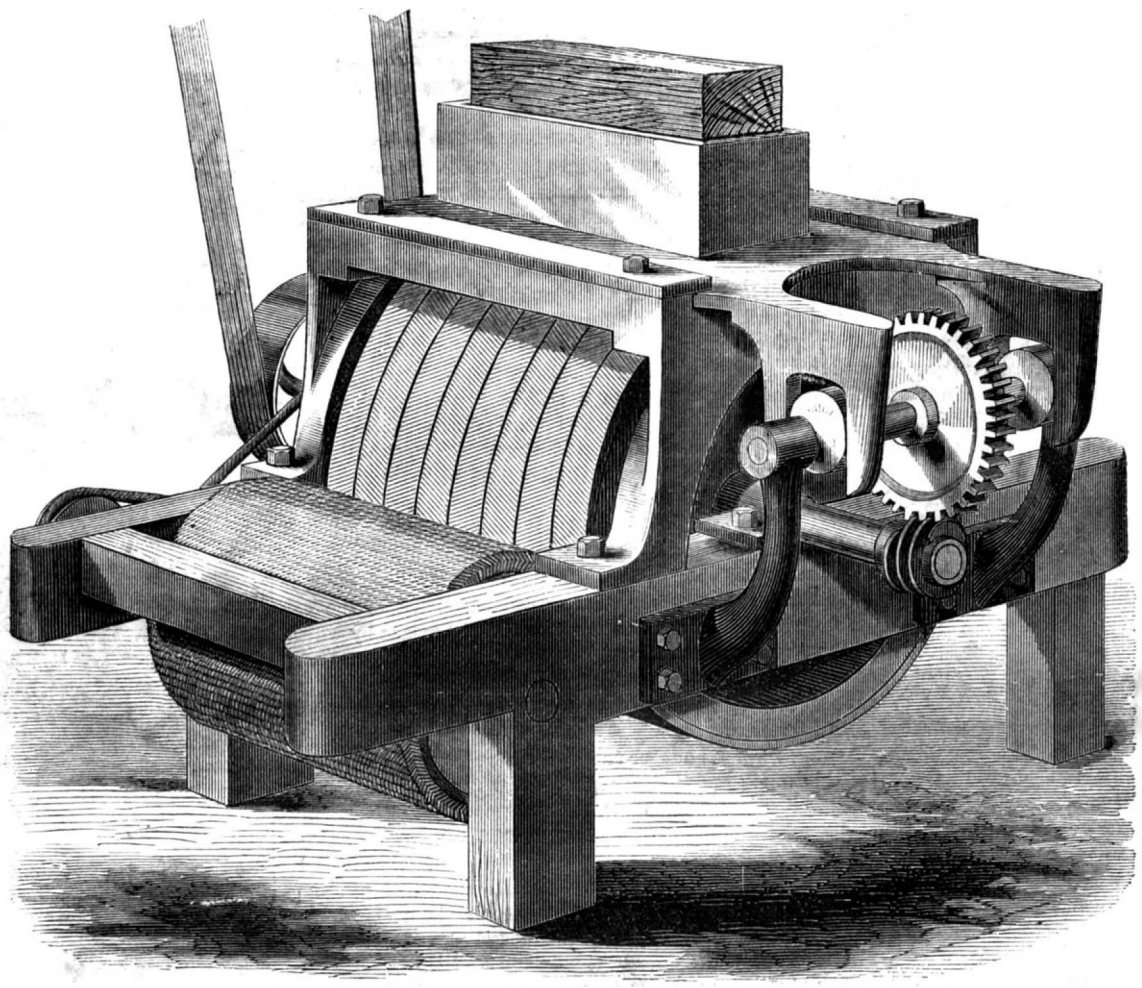
Improvement in Machine for Making Paper Pulp.

The use of some of the softer sorts of wood for producing fibrous pulp suitable to paper making is quite common, but the means of disintegrating the material and preparing it for the paper maker have not been altogether satisfactory. One consists mainly in softening the wood by steam and then discharging it from a gun or tube, it being blown into filaments by the force of the explosion. Others comminute the material by mechanical processes. The machine represented in the engraving is intended to produce the desired result in this latter way. It consists of a cylinder mounted on a frame, the cylinder being covered with a jacket of rasping, filing, or cutting material, formed by successive circles of steel or chilled iron segments as seen in the engraving. At one end of the cylinder shaft the power is attached, and at the other end the shaft carries a worm that engages with a gear turning on a shaft in bearings attached to the frame. On this gear shaft are two cams, or eccentrics, that, turning between jaws or "struts" of a sliding frame, give a gradual reciprocating motion to a hopper or receiver for holding the block of wood to be comminuted by the machine. The lower surface of the wood bears upon the rasping or cutting surface of the cylinder, and its gradual reciprocatory motion insures equality of abrasion, without leaving the ridges which otherwise would correspond with the interspaces of the cylinder coating. A weight or spring, or any other suitable device, can be attached, if desired, to the block for the purpose of graduating its amount of pressure on the cylinder.



BURGHARDT'S WOOD PULPING MACHINE.

Somewhat below the center of the rasping cylinder is hung a a smaller cylinder covered with card clothing or stiff bristles, and receives motion from the shaft of the main cylinder by means of pulleys and belt, as seen in the engraving, or gears; the motion being in reverse of that of the rasping cylinder, and more rapid. This card-clothed cylinder is intended to remove the "fluff" or fiber from the teeth of the cutting cylinder, and to keep them clear. The material is deposited beneath the machine in any convenient receptacle. The fiber, as it comes from the machine, appears, under the microscope, and also when tested by the touch, to be well adapted for mixing with other paper stock. It is neither sawdust nor coarse threads, but a floss-like fiber similar to short-stapled cotton or flax.

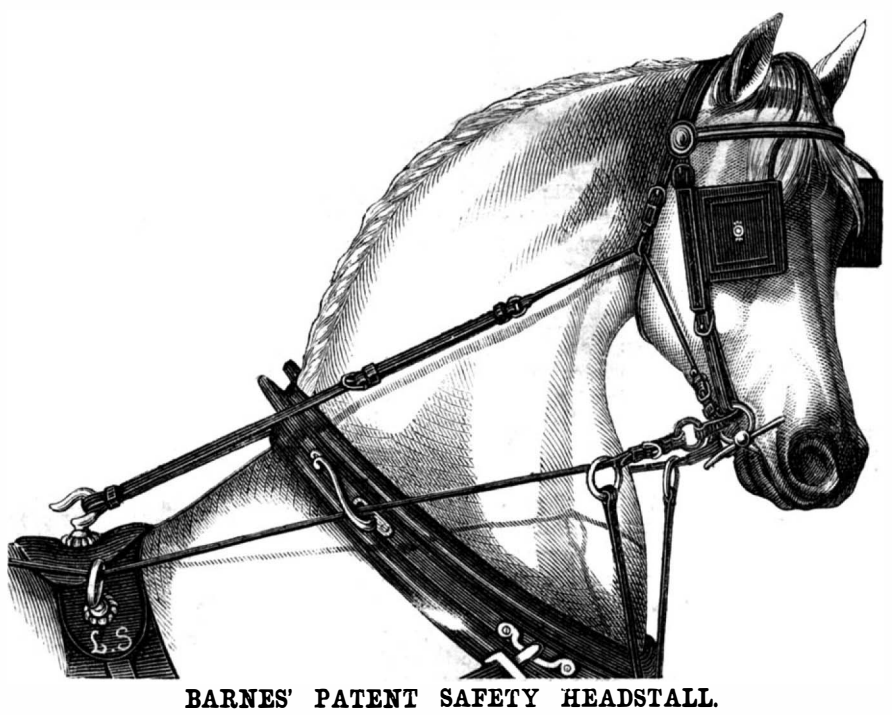
Patent pending through the Scientific American Patent Agency. For further information, address Frederick Burghardt, care J. M. Burghardt, Great Barrington, Mass.

Driving Reins for Horses.

Horses are excellent servants but bad masters; and, like steam, water, and all other powerful aids to man, must be kept under control to be useful instead of dangerous. Many devices have been contrived to control a vicious or frightened horse, but some of them are too complicated, and when, as is frequently the case in a runaway, the driver, as well as the horse, loses his presence of mind, the proper manipulation of the device s neglected until the mischief is done. It is evident that, in such cases, a simple rein, to which the driver instinctively clings, would be much better than any independent and complicated arrangement. Such is that shown in the engraving.

Instead of the rein being connected directly with the ring of the bit, it is attached to the ring of the cheek strap, passing through the bit ring and connected to the junction of the throat strap and head brace, and so is, of itself, a portion of the headstall. The rein passes from this strap through the martingale ring, the collar guides, and the terrets, as usual. The operation is easily understood. By pulling on the reins the bit is lifted against the corner of the horse's mouth, instead of merely pressing against his lower jaw. The leverage thus exerted is so great, that even hard-bitted horses may be held by the strength of any woman, or of a boy of ten or twelve years. It is simple and neat, and as it has no unusual appliances, is managed as easily as the ordinary driving rein, from which it hardly differs in appearance. It costs no more than the ordinary style. Its operation can be easily understood by a reference to the engraving.

The patent is dated Aug. 11, 1868. Orders should be sent



BARNES' PATENT SAFETY HEADSTALL.

to G. W. Barnes & Son, 315½ Bowery, New York city, where specimens may be seen.

THE GREAT POLISH SALT MINES.

A correspondent, writing from Cracow, says that the famous salt mine of Wieliczka, which brings a net annual revenue to the Austrian government of upwards of £600,000, is threatened with total destruction by a stream of water which made its appearance on the 19th of January, while the workmen were digging in one of the lower shafts in search of potash. All the means hitherto adopted of preventing the water from inundating the mine have been unsuccessful; it flows at the rate of 120 cubic feet a minute, and has already almost filled the lower passages, rapidly dissolving the salt with which it comes in contact. A government engineer has arrived from Vienna, and a channel is being built under his directions for confining the water and leading it out of the mine, but it is feared that the salt columns which support the transverse shafts may be undermined before the work can be completed.

These salt mines the most renowned in the world, are situated about 8 miles from the city of Cracow, having their mouth or principal entrance in the pleasant village of Wieliczka, which lies on the slope of a wooded hill, and is very picturesque. The superintendents of these mines reside here, and their dwellings, together with the government offices and large storehouses for salt, occupy a pretty eminence, and are conspicuous from a distance. A great many people from various countries visit these remarkable excavations, and are well rewarded for their trouble. Every year for many centuries having added to their depth and extent, the mines are now of immense and almost inconceivable magnitude. In order to visit them the traveler must procure a permit from the government, which is easily done, the proper officer being on the spot. The opening or square shaft, through which the descent is made, is covered by a building or office; and here the visitor is dressed in a long coarse linen blouse, to protect his clothing while underground. A door is opened and he goes down by stairs, preceded by boys, who carry lamps only to make the darkness more visible. Or, if he is so disposed, he can descend by the windlass and ropes suspended in the center of the shaft. More frequently visitors descend by the stairways and come up by the ropes.

No salt is seen for a depth of more than 200 feet; then the veins begin to appear in a bed of clay and limestone. 50 feet further down the stairs terminate, and the salt is everywhere; nothing but salt; overhead, under foot, on every side are dark grey masses of solid salt, whose points and surfaces sparkle in the lamp light. Galleries now branch off in all directions. Lights twinkle, and groups of laborers are seen hacking the floors, or removing in wheelbarrows blocks that have already been cut out. Passing on through one of these galleries a chapel is reached, which is only the first and oldest of many apartments thus designated, differing only in size and decorations. It is called the chapel of St. Anthony, and is supported by columns of salt left in quarrying the solid rock. It has an alter, crucifix, statues of saints large as life, all of pure salt. The air in this part of the mines, near the surface, is much more moist than that of the deeper excavations, so that the process of dissolving goes on slowly, and in consequence some of these statutes of salt are gradually losing their shape. The head of one is nearly gone, the limbs of another, while deep furrows are observable in many places upon their bodies, making them present a very grotesque appearance when lighted up or exhibition. The smoke of the torches and lamps, added to the dampness of the air, blackens the surface of all objects not recently cut, so that these statutes might be mistaken for black marble.

Onward and downward goes the visitor, through halls, chambers, tunnels innumerable. Stairs descend lower and lower, and similar apartments re-appear, till he loses all sense of distance or direction, blindly following his conductors, who point out from time to time localities or objects of peculiar interest where all is surpassingly wonderful. Every thing

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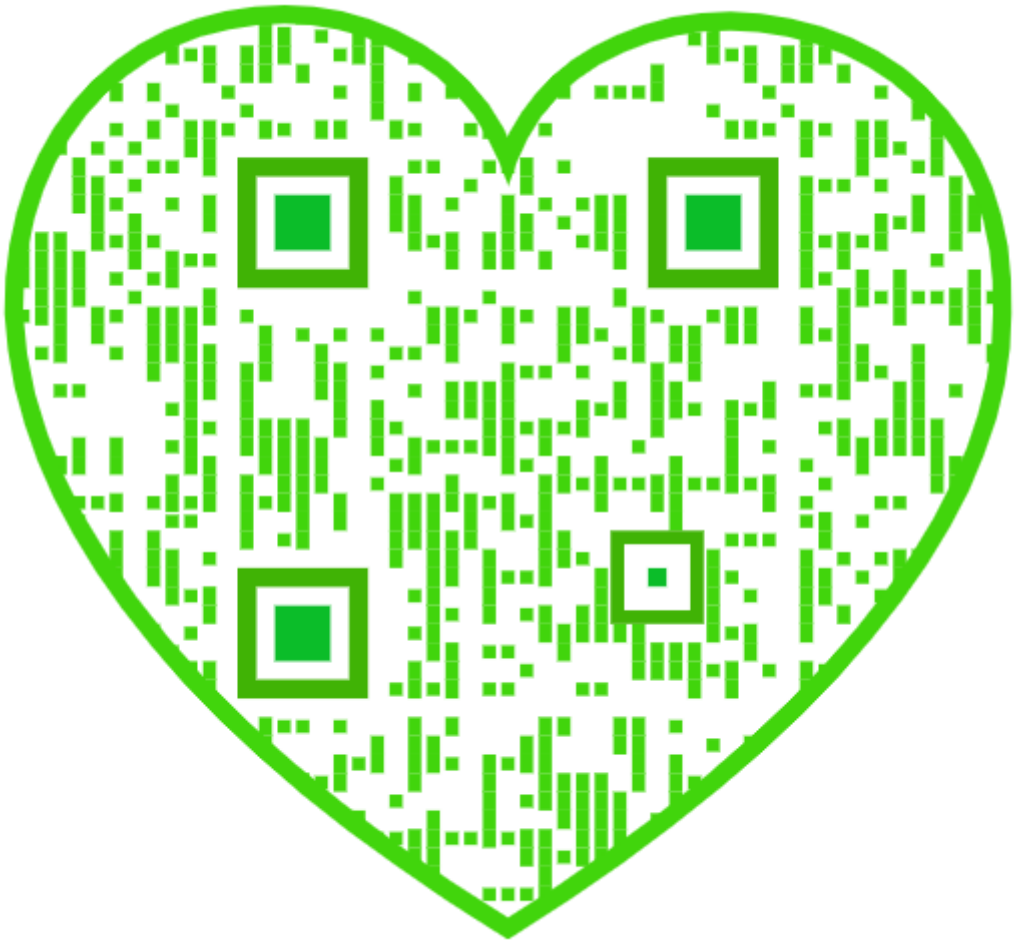

is solid salt, except where some insecure roof is supported by huge timbers, or a wooden bridge is thrown over some vast chasm from which thousands of tuns of salt have been quarried and removed. The air grows drier and purer the deeper you go; the points and faces of the rock more crystalline and brilliant. One enormous hall, out of which has been cut a million hundred weight of salt, has the appearance of a theater. It is over 100 feet high, and the blocks, taken out in regular layers, represent the seats for the spectators.

In another spacious vault stand two obelisks of salt, which commemorate the visit of the Emperor Francis I. and his empress. Further on you come to a lake more than 20 feet deep, intensely salt, of course, which is crossed in a heavy square boat. In this you paddle through a tunnel which connects two immense halls. While in the middle of the tunnel the walls behind you and before you are brilliantly lighted up, and a gun is discharged, which, with its echoes and reverberations, almost deafens you. Both air and water tremble visibly under the strange and frightful concussion, and you are only too thankful to reach the end of your voyage and stand once more on solid salt. Francis Joseph's ballroom is another of the wonders of this subterranean world. It is an immense apartment, both in hight and extent, and on some festive occasions is used in dancing. It is lighted by six large chandeliers, which resemble cut glass, but are in reality of crystalline rock salt, statues of Vulcan and Neptune, sculptured from salt, also adorn this hall, which, well illuminated, exhibits a marvelous splendor, the light being reflected from innumerable brilliant points and angles of the glittering rock.

Down, down, down hundreds of feet further, through labyrinths of shafts, galleries and chambers, crooked passages, vaulted archways, and openings which have no name and seemingly on end. Groups of miners, naked to the hips, are everywhere busy with the implements of their darksome labors; pick, mallet, and wedge are employed incessantly in blocking out and separating the solid mass. Their manner of work is the same simple process in use centuries ago, perhaps by the remotest ancestors of these very men, in these very mines, for they are immensely old. The blocks are marked out on the surface of the rock by grooves. One side is then deepened to the required thickness, and wedges being inserted under the block, it is soon split off. It is then divided into pieces of a hundred pounds each, and in this shape is ready for sale. It is removed in carts or barrows to the shaft, where it is hoisted up, stage after stage, to the surface. Horses and mules are employed, and it is said that some of these animals are born and raised in the mines.

The number of laborers constantly at work is from 1,000 to 2,000. They all live outside the excavations at the present day, although traditions exist of times when the families of some of the miners had their abodes in these fearful depths, and where children were born and reared to the occupation of their parents, seldom or never visiting the outside world. The thing is neither impossible nor incredible, as the air in the lowest part of the mines is considered more salubrious than in their upper regions. But the practice was long ago discontinued, if it ever existed to any extent.

The miners, who are fine muscular and healthy men, are divided into gangs for work, and relieve each other every six hours. A gang will quarry in that time about 1,000 lbs. weight. The temperature is very even all the year round, and the preservative power of the air is such that wood never decays, but retains its qualities for centuries. People with pulmonary affections are said to have been much benefited by inhaling freely the atmosphere of the mines.

When and how this wonderful deposit of salt was originally discovered is unknown. It was worked in the 12th century, and how much earlier none can tell. Some traditions are held by the ignorant and superstitious peasants of the country, which ascribe the discovery to miraculous or supernatural agency. Others say that a certain Queen of Poland, on visiting the spot, commanded her subjects to dig there, assuring them that there was a most precious treasure beneath them. After a while a crystal of salt was found, which, as an earnest of the abundance afterwards discovered, this princess had set in a ring as a royal gem, and wore to the day of her death.

The extent of the deposit has not yet been fully ascertained. It commences, as we have before stated, about 200 feet below the surface, and has a solid depth of nearly 700 feet, and rests on a bed of compact limestone, such as forms the peaks of the Carpathian Mountains, which it seems to follow. It has already been explored to the continuous length of 2½ miles; and it is estimated that the aggregate length of all the innumerable excavations of these mines amounts to more than 400 miles.—*Mining Journal.*

COAL OR SUN.

The *Mining Journal*, of London, makes the following criticisms upon the proposition of Capt. Ericsson to utilize the direct heat of the sun as a motive power, which we copy on account of their suggestive character, rather than the justness of its views in regard to Capt. Ericsson's invention. Knowing confessedly nothing of the means employed, the *Mining Journal* has put itself into the position deprecated by Solomon, that of "one who answereth a matter before he heareth it," and it may be that the developments promised us by Capt. Ericsson in the coming spring will prove that it "is a folly and a shame unto it." The *Journal* says that at the outset of his proposition, Mr. Ericsson appears to have fallen into the error of considering "concentration" and "condensation" of the sun's rays as convertible terms. This, however, is not so. Every schoolboy who has blistered his hand with a burning glass knows very well the practical meaning of "concentrating" the sun's rays. The "condensation" of them—that is, the fixing of their calorific forces in some latent and portable form, whence they can afterward be liberated and utilized—is a very different matter indeed. The one is simply mechanical, the other is chemical, and the only agency with which we are at present acquainted capable of performing this latter very important operation is the leaf of the living tree or plant, which, under the influence of the sun's rays, separates the constituents of the carbonic acid floating in the atmosphere, absorbing the elemental carbon and liberating the oxygen.

This operation is of a refrigerating nature, but the caloric of the sun's rays, instead of being dissipated in effecting the separation above described, becomes fixed or latent (that is, hidden or concealed), in connection with the elemental carbon, and the resultant accretion is what we commonly term carbon—that is, elemental carbon *plus* the latent heat of the sun's rays, which has been expended upon it in separating it from the oxygen with which it was previously combined in the carbonic acid, and which latent heat has taken the place of that gas, through the agency of that undefinable something which we call the vital energy of the plant, but about which we know very little. Thus, in solid carbon we have the calorific forces of the rays truly "condensed." When this substance is first formed it is, of course, mixed with various volatile juices and earthy matters, formed in the growing plant, and which it has derived from other sources. But once formed, this solid carbon is capable of a great many transformations without parting with the latent heat it has received, and which it still retains, stored up in connection with it. Thus it is changed into peat, coal, diamond, and, by assimilation from the carbonaceous food we take, it forms a large portion of the flesh and bones of animals.

This solid carbon can only be made to give up the latent heat stored in connection with it by its being brought into contact with oxygen at a certain temperature and under certain conditions. We effect this operation by placing the solid carbonaceous matters in some suitable receptacle, such as a common fire-grate, or boiler furnace, and having raised the initial temperature to a sufficient point by some extraneous means, we then allow a stream of atmospheric air to pass through the materials. The oxygen from the air then uniting again with the elemental carbon, liberates the stored-up latent heat, which we utilize for the production of force in various ways, the elemental carbon passing away with its original companion, the oxygen, as carbonic acid.

This hypothesis, which we admit is open to discussion, is the history and meaning of the "condensation" of the calorific influences of the sun's rays, and of the means by which, after they have been stored up for unknown ages, we may again derive use and comfort from them. But now the question comes—Has Mr. Ericsson indicated a cheaper or more portable plan for the storing the calorific forces of the sun's rays than that worked out for us in the natural way? We venture to think not; and that our coal owners need not at present fear him as a rival, while those who are annually expending large sums in utilizing the forces of heat must wait for a long time before they find a cheaper method of doing so than by consuming our ordinary fuel. Mr. Ericsson does not tell us that he has discovered some other cheap and portable vehicle by which the sun's rays can be absorbed, and stored in a latent shape, and thence by simple and cheap means liberated again at will for use. It is evident that he has no idea of chemical "condensation," but only of some mechanical "concentration," the economics of which it may be worth while to consider a little. He states that "in weather *suitable* for the action of sun machines, the action of the sun, in a superfices of 100 square feet, can evaporate 489 cubic inches of water in an hour, which is equal to the action of a motive force capable of raising 29,750 lb. one foot high." This quantity will be more or less as the weather is more or less "suitable." The word "suitable," as descriptive of the evaporative power of the sun's rays, not being fixed by any thermometric scale, it is impossible to follow Mr. Ericsson's calculation with the exactness we should desire, but, taking his basis, we have as our starting point the statement that 100 square feet of "concentrators" will produce nearly 1-horse power when the weather permits—that is, when the sun shines "suitably;" whence it follows, under the same conditions, that 10-horse power will require 1,000 square feet of the same instruments. But as, unfortunately, the power will only be produced while the sun shines "suitably," and as that luminary is only above the horizon on the average of twelve out of twenty-four hours, and as in the winter time his presence is much less propitious, and as, in addition, there are many days together when he does not shine at all, then, in order to produce anything like a uniform power, we must have an area of "concentrators" at least five times that which would be necessary if the sun shone "suitably" all the twenty-four hours round, and there were no such things as clouds. We shall thus find that nearly an acre of "concentrators" will be necessary to produce, with any regularity, 100-horse power.

But even this could not be guaranteed in the November Fogs and winter months generally, when it might require an area equal to a large estate to produce 100-horse power. fancy for a moment the blank despair of some enthusiastic manufacturer, living in a crowded town, who desired to drive his cotton mill by "concentrated" sun's rays, being told that to do so he must purchase an acre of "concentators," which we presume must be some sort of reflector, of metal or glass; that he must then purchase an acre of ground on which to erect them; that he must cover that acre with a network of steampipes, fittings, and boilers; that each "concentrator" would require expensive machinery always to keep it facing the sun at the proper angle; that all this machinery would have to be worked prior to any power passing into his accumulators, which would be massive and extraordinary machines, at least five times as large as an ordinary 100-horse power engine; that, further, he would have to keep a small army of men, with cotton-waste and wash-leather, constantly cleaning his acre of "concentrators," to have them in readiness to reflect the rays of the sun; and that into it all, in the event of a succession of dark or cloudy days supervening, he could not even then be guaranteed the continuous demand of his 100-horse power—and then we may form some slight idea of what Mr. Ericsson thinks he can offer in competition with our ordinary fuel.

In further proof, however, that the time of the "sun machine" is not yet, we should note that our ordinary fuel has driven the windmill out of the market, the motive power of which is as cheap as sunlight; and as, horse power to horse power, the outlay to establish a combination of windmills will be less than to establish a combination of "sun machines," it necessarily follows that these latter will not be brought into practical use until not only our coal is exhausted, but the wind ceases to blow.

TOBACCO PIPES.

The practice of smoking tobacco has spread over the whol habitable globe, and the consumption of this narcotic, enormous as it has been of late years, is rapidly on the increase; so much so, that the manufacture of tobacco pipes has in many countries acquired quite a considerable importance.

Pipes vary in form, in composition, and in value, from the common clay pipe worth a fraction of a cent, or the "corn-cob" of our Southern freedman, which costs nothing, to the aristocratic hookah made of solid silver or gold-plated copper, elaborately carved and sculptured, from which flexible tubes convey the delightful flavor of the "Latakia" to the luxurious and dreamy oriental reclining on his silken couch.

The talents of the draftsman, the potter, the sculptor, the turner, the polisher, the painter, the gilder, and the gold and the silver smith, are all called into requisition by the modern pipe manufacturer.

The substances used are meerschaum, porcelain, various varieties of clay, briar root, and several dark colored woods.

The period when the first pipe was smoked by man is hidden to us by the impenetrable veil of by-gone ages, but no doubt can be entertained as to its having been done by the aboriginal American. Ancient stone pipes of fanciful shapes have frequently been ploughed up, in various parts of this continent, such as North-Western New York, Cayuga county, etc., and have been found by ourselves, buried amid the remarkable ruins of the pre-historic cities of Central America.

MEERSCHAUM PIPES.

The richest and most beautiful pipes are manufactured from varieties of a clay-like substance, *magnesite* or *scpiolite*, better known as "meerschaum" which translated into English means sea scum or sea froth; this name being due to its low specific gravity and light color. Sepiolite is of a fine earthy texture, smooth to the touch, and is found in masses in stratified alluvial deposits among serpentine. It is a product of the decomposition of carbonate of magnesia, its composition is silica 60·8, magnesia 27·1, water 12·1 in 100 parts.

Meerschaum is found in Asia Minor in the plains of Eskihi-Sher or Eski-Schehir, in Greece, at Egribos in the island of Negropont, in the isle of Samos, at Kiltschik in Natolia, in the Crimea, at Hrubschitz in Moravia, in Morocco, at Vallecas in Spain (where it is used as a building stone), at Baldissero in Piedmont, in Cornwall, in France (in the departments of the Gard, of Seine et Marne, and of the Seine), but the most remarkable quarries worked at present are situated at Brussa at the foot of Mount Olympus.

When first dug up it is damp, soft, and greasy. The Tartars use it as soap to wash linen, and the Arabs of Algeria in the same manner in the Moorish baths. In masses it floats on water. The color is grayish-white, white, or with a faint yellowish or reddish tinge.

Vienna, the capital of Austria, was for many years the principal marketfor Asiatic meerschaum. It was from thence that the celebrated pipe makers of Ruhla in Saxony, who long enjoyed the monopoly of this branch of manufacture, obtained their necessary supplies. These Saxon pipes were generally sold at the annual fairs at Leipzig.

The demand for "meerschaums" having increased quite rapidly, their price was enhanced and monopoly soon ceased. The French, stepping in, started a serious competition to the Germans, and have at this present day taken a large share of the trade into their own hands. The home manufacture of France is not only self-sufficient, but large numbers of pipes are now exported from thence to foreign countries. Many of the Parisian pipe makers draw their supplies of raw material directly from the mines. Taste and elegance of design, which are general characteristics of the manufactures of the French, are very conspicuous in their pipes. Those made at Nimes, from magnesite of the department of the Gard, are also held in high estimation. A large business in meerschaum pipes is done in Austria at this time.

Each finished pipe offered for sale is placed in a separate velvet or silk-lined case; and all genuine meerschaums are mounted in silver—sometimes in gold—and are furnished with amber mouth-pieces.

The meerschaum itself is shipped in lumps of considerable size packed in wooden boxes. The value of these pipes depends on their size, on their workmanship, on the purity of the material employed, and on the richness of the mountings; their cost is however always comparatively high and may reach fabulous or "fancy" prices.

The meerschaum bowls are prepared by soaking first in tallow, then in wax, and finally by carving and polishing.

We need hardly remark to our smoking readers—and their name is legion—that the high price of meerschaum pipes has

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led to the introduction of many cheaper substitutes and imitations, some of which are not easily detected by an unpracticed eye. None of these can however compare in lightness, or porosity to the genuine material.

PORCELAIN PIPES.

These pipes are manufactured in Germany, from whence they are forwarded to all parts of the world. They are made from very pure china-clay, or kaolin, and are coated with a bright enamel. Porcelain pipes are either plain or painted, in which latter case, their price is proportionate to the artistic labor expended on them, which is often of a high order.

The porcelain pipe is an emblem of old "fatherland" to every Teuton, when he thinks of the "long ago" and the "old friends far away."

CLAY PIPES.

Clay pipes are manufactured in England, France, Belgium, Holland, Spain, Italy, etc. Many varieties are known, all of which may be classed under two heads; namely, pipes with stem and bowl united, and pipes in which the bowl alone is made of clay and the stem of some other substance.

Among the first we find, clay pipes, white, light, and smooth; clay pipes with ribs and raised lines; clay pipes, white inside and colored outside; clay pipes with external molded designs; and in general, the "common run" of all democratic or workingmen's clay pipes.

In the second category we have pipe bowls representing heads of men, of women, of children, of animals, of fantastic subjects, or the busts of the living heroes of the day. We have in revolutionary times in Europe often seen clay pipes symbolising political doctrines or caricaturing those in power.

In England the large majority of pipes are made from clay dug at Purbeck in Dorsetshire. The best French pipes are those of Saint Omer, Givet, Marseilles, Nimes, and some other localities.

The production of clay pipes is immense, as may be judged from the fact that one manufacturer alone offers three thousand different models for sale. All clay pipes are made in molds from well-prepared clay, their value varying according to the difficulties of workmanship. The cheapest sell as low as fifty cents per gross of 12 dozen; the highest seldom exceed $1·20 per gross. Clay pipes are best packed in boxes with oat straw as a filling.

TURKISH AND ALGERIAN PIPES.

In many parts of Turkey and of Algeria, pipes are made from clay or pulverized cement of a reddish brown color. The bowls of these pipes are of different shape from those in use in the north of Europe, being wide or nearly funnel-shaped at their orifice. Some of these pipes are quite plain and exceedingly cheap. Others are covered with the impress of small flowers with raised centers, stamped on them by means of a seal, before baking. Others again, are diversely gilded in arabesque or moorish designs. The bowls of some Algerian pipes we examined, were made from some kind of very heavy wood, studded with imbedded beads and ornamented with brass wire.

The stem of a Turkish pipe consists of a long rod of the wild cherry tree pierced in the center by means of a red hot iron. The "trappings" and ornaments about these pipes are often elaborate and not devoid of a certain degree of peculiar elegance; the mouth-piece is invariably amber.

HOOKAH OR HOUKAR—NARGHILAR.

This gigantic pipe, resembling a censer, from which numerous pliant tubes diverge, permitting different persons in various portions of a room to enjoy a simultaneous "smoke," is essentially a sociable, oriental luxury. The smoke of the tobacco is generally cooled and deprived of some of its acrid principles by being passed through water in this apparatus. Hookahs or narghilars, being often made of solid richly carved silver, are expensive and seldom manufactured out of Turkey or Algeria. In a well established Mahomedan's mansion, this article is never wanting. A special servant, the "houkar boudar" has no other duty than that of attending to his master's houkar which is kept lighted and filled, ready for use, at all hours of the day or night.

BRIAR PIPES.

The old fashioned wood and horn pipes have of late years been superseded by the well-known "briar" pipe made from the hard, comparatively incombustible, wood of various species of briar, and of many other trees.

These pipes are manufactured in Germany and in France, but more particularly in this latter country where Saint Claude in the Jura has the monopoly of the commoner kinds, and the city of Paris, that of the more expensive carved ones. Briar pipes are packed in pasteboard boxes holding from two to three dozen. Their forms are very varied and their mouthpieces of either horn or amber. Their cost in Europe varies from $5 to $25 per gross, according to their degree of finish. Some of the elaborately sculptured Paris briar pipes, sell as high as from $1 to $2 each, in which case the bowl in generally lined with an internal coating of meerschaum.

The manufacture of both meerschaum and briar pipes has of late been introduced into the United States, and appears to be in a thriving condition.

In our next number we will give an account of the method of manufacturing the ordinary clay tobacco pipes, with a description of the furnace used to bake them.

Watch-Glasses---How they are Made A Look at the Manufactory---The Different Operations.

At Sarrebourg, a small town near the Vosges Mountains, which numbers about 2,300 inhabitants, there is a manufactory of watch-glasses which owes its origin to the well-known glass-works of Valerysthal in its vicinity, whence the blown glass is obtained. It is well known that watch-glasses are of two kinds. One kind is simply cut out of blown globes, and receives no other preparation, so to speak, than that of a trimming of the border, and a more or less imperfect smoothing. This kind includes all the common concavo-convex glasses which are applied to common watches on account of their cheapness. Their convexity is a great inconvenience. The other kind consists of flat glasses. These are formed from the primitive convex glasses by operations which render them more costly, it is true, but then they are much more convenient. At Sarrebourg these are called *verres cheves*. *Chever* is an old French word which signifies to bulge or hollow out, but has now no other use than that to which allusion has been made. If the flat watch-glass had been prepared from glass having a plane surface we could comprehend the designation *cheve* which has been given to it, for the *cheve* glass is not absolutely flat, and to form it a bulging out from its border would have to be made. But it is not so worked; on the contrary, the convexity of the common watch-glass has to be diminished in order to obtain a flat glass; hence, it seems that the expression used designates precisely the reverse of what it ought to indicate. The manufacture of flat glasses, although not complicated, requires a series of operations which the fragile nature of the material must render very delicate. We will now pass them in review.

FIRST OPERATION.—The first operation is that of cutting out. It consists in cutting according to the pattern the blown globes supplied by the glass-works. To effect this, a concavo-convex watch-glass of the size wanted is applied to the surface of the globe, and, both being held in one hand, the glass is broken all round by striking little sharp blows with a pipe tube made red hot. As the glass does not crack according to an exact circumference, merely an irregular bowl is thus obtained, the angles of which are afterwards taken off coarsely by grating away the material with common flat chisels deprived of edge. This first work is done by women, who are paid at the rate of twenty-five centimes per gross; each worker can cut eight gross per day.

SECOND OPERATION.—The glasses cut out in the rough form (calottes), and having already undergone a first trial, which classes them according to their qualities, are placed one by one on molds of refractory clay, and submitted to softening in a muffle heated to redness and constantly open. The workman takes each mold successively with small pincers, places it for a few seconds in the muffle, and, withdrawing it almost immediately, applies a pad of paper upon the softened glass, and by rapid pressing in all directions, causes it to lose its convexity and to take the form of the mold which is more or less flat but slightly arched at the circumference. This opation is called *chevage*, whence the name of *cheve* given to glass which has undergone it, and *cheveur* to the workman who practices it. The molds are carefully made to shape by turners, and classed according to their dimensions, which correspond to those which trade adopts for watch-glasses. As to the muffles, several of them are put in the same oven side by side, and each is attended to by a workman (*cheveur*), who produces on an average six gross per day. The pay for shaping is sixty centimes per gross.

THIRD OPERATION.—Once flattened and classed according to their thickness and dimensions, the glasses are submitted to dressing. The operation of dressing, which is performed by women, consists in shaving each glass by clipping away with flat and wide chisels that part of the border which gets beyond the circumference given by the mold. This work demands more delicacy than the ordinary cutting out, for here the breakage is more expensive, since the glass has already received two workings. It is paid at the rate of 20 to 25 centimes per gross, according to the thickness of the glass.

FOURTH OPERATION.—We now come to the bezeling. Stuck with pitch upon a wooden chuck, which the workman holds in his hand, the glass undergoes a first reducing by means of a grindstone and sand, with a view of preparing the bezel edge which has to fit in the circle of the watch. Then it is placed in a lathe and the bezel is finished off with pumice-stone. The bezeler receives one franc twenty-five centimes to three francs per gross, according to the thickness of the glass; he delivers from one to two gross per day.

FIFTH OPERATION.—From the hands of the bezeler the glass is carried to the smoothing shop, where it is submitted to the action of a smoothing wheel mounted upon a horizontal axis, and upon which pumice-stone powder with water is poured from time to time. This wheel, which has a diameter of four decimeters when new, is formed of two cheeks of wood, between which is wrapped and strongly pressed together pieces of waste cloth. There are eighteen similar smoothers placed in movement by one water wheel. This operation is paid at the rate of two francs twenty-five centimes per gross.

SIXTH OPERATION.—In short, the glass is finished, but it is dull, and would not in this state be accepted by the trade; hence, the operation of polishing, which consists in polishing and brightening at a wheel with English rouge or with tin-ashes (oxide of tin obtained by calcination). This wheel, which bears the name of "mushroom," is formed with cloth like the previous one, but it is mounted upon a vertical axis which the workman commands with his foot. The pay for this operation is 1 franc per gross for thin glasses, and 1 franc 25 centimes for thick glasses.

Thus, the different operations are the cutting out, the flattening, the dressing, the bezeling, the smoothing, and the polishing. On arriving at the store, where they are prepared for sending out, the glasses are again examined one by one and tried in a gage which finally classes them, and rejects, to be returned to the workshops, those which have not the proper size. There are then six payments for fashioning, which represents for a gross a total varying from 5 francs 55 centimes, to 7 francs 50 centimes, to which should be added the price of the blown globes, which is about 1 franc 50 centimes the kilogramme.—*Phrenological Journal.*

For the Scientific American.

"WASTE" AND "ECONOMY" OF FUEL.

NO. 3.

ON "PRIMING" IN STEAM BOILERS.

The economy in fuel realized by the use of tubular boilers in comparison with non-tubular, is in the ratio of 1·35 to 1·; but this advantage is often more than neutralized by the greater liability of the first to incrustation and to priming, especially in the case of vertical boilers.

Priming is the result of violent ebullition in boilers with restricted "water ways," where the free circulation is impeded and is made manifest by irregular or intermittent action and by large quantities of water being carried off in mechanical suspension by the steam produced.

The waste of fuel caused by priming is not readily determined. In many cases where nine pounds of water are fed into a boiler and supposed to be converted into steam, not more than five are really thus converted, and the remainder, or hot water, is carried off as such in admixture with the steam. The loss in the above case may be calculated as follows:

Supposing the pressure in the boiler to be 90 pounds per square inch, the temperature will be 320° Fah., and by Regnault's formula (320—32) × ·305 + 1123·7, we find 1211·54 to be the total number of units of heat contained in one pound. If the feed water has been introduced at 60° Fah., then the amount of heat derived from the fuel would be 1211·54—(60—32) = 1183·54 units of heat for every pound of working steam generated.

Five pounds of steam will contain 5917·70 units, and the water at boiling point (320° Fah.) will contain 320—32 = 288 units per pound, or 1152 units for the 4 pounds, this being equivalent to a net loss of 19·47 per cent of the fuel practically consumed.

It is found difficult to maintain the pressure in cases of priming and the vacuum is seriously injured by it, so that this occurrence must always be regarded as most undesirable and as a source of pecuniary loss.

Priming being most frequently due to defective boiler construction, can generally be remedied only by making rational changes in the interior distribution of parts, or by the substitution of one system of boiler for another.

A less generally understood method of counteracting the injurious effects of water in steam is by "superheating." This may be done either by direct action on the whole of the steam generated, or by the admixture of a certain determined quantity of superheated steam just sufficient to cause the evaporation of the suspended water and its conversion into working steam of the desired tension. The calculation of this quantity and of the temperature to which it will have to be raised depends on many and various causes.

Knowing the quantity of free water contained in a given weight of steam, it will always be easy to determine the best superheating temperature necessary to be applied to any given number of pounds of steam in order to convert "wet" into "dry," or in other words, to convert suspended water into good working steam of the requisite tension. For this purpose proceed as follows:

Subtract the total number of units of heat (b) contained in the mixture of steam and water, from the computed total of units (a) which would be contained in the same weight of working steam of the required tension; divide the result by the number of pounds of steam (c) which it is desired to superheat; multiply this quotient by the specific heat of steam 0·847 and add the number of degrees (d) of Fahrenheit thermometer corresponding to the given tension. This last addition furnishes the "theoretical" superheating temperature (x) needed, but is "practically" too low as no allowance has been made for losses.

By our formula we would have $\frac{a-b}{c} \times 0{\cdot}847 + d = x$

Whenever the superheating can be realized by means of the waste heat of the furnace, a very material gain in the amount of fuel consumed will always be noticeable; when, however, (as is often done) the superheating is effected by the combustion of an extra quantity of coal the benefit derived from it is comparatively inconsiderable.

Some other day we may again refer to the practical advantages and disadvantages of superheated steam, and to the subject of superheaters in general and their various applications. This is an interesting subject which the experiments of Wethered, Partridge, Pilgrim, Lafond, and many others have failed to completely elucidate in its multitudinous aspects.

The practical conclusion derived from the above considerations is: If your boiler primes, either "swap" it off for another, or superheat your steam moderately, but beware of anti-priming doctors and their remedies.

CULTIVATION OF SUGAR IN LOUISIANA.—A correspondent from Louisiana writes us that the great want of that State is labor. Notwithstanding the planters are making use of all the labor-saving machinery which they can get, they still lack laborers. Farm hands get from $14 to $30 per month with board; carpenters $75 to $125, blacksmiths from $45 to $60. He says if that State can get the labor, it alone will produce all the sugar needed for home consumption. He invites northern people to turn their attention to the opportunities for profitable investment now offering there, and says there are land and work for all who will come.

LARGE quantities of celestine, sulphate of strontia, a mineral of a beautiful delicate blue color, well known to mineralogists, have been found at Mokattam in Egypt, in limestone beds.

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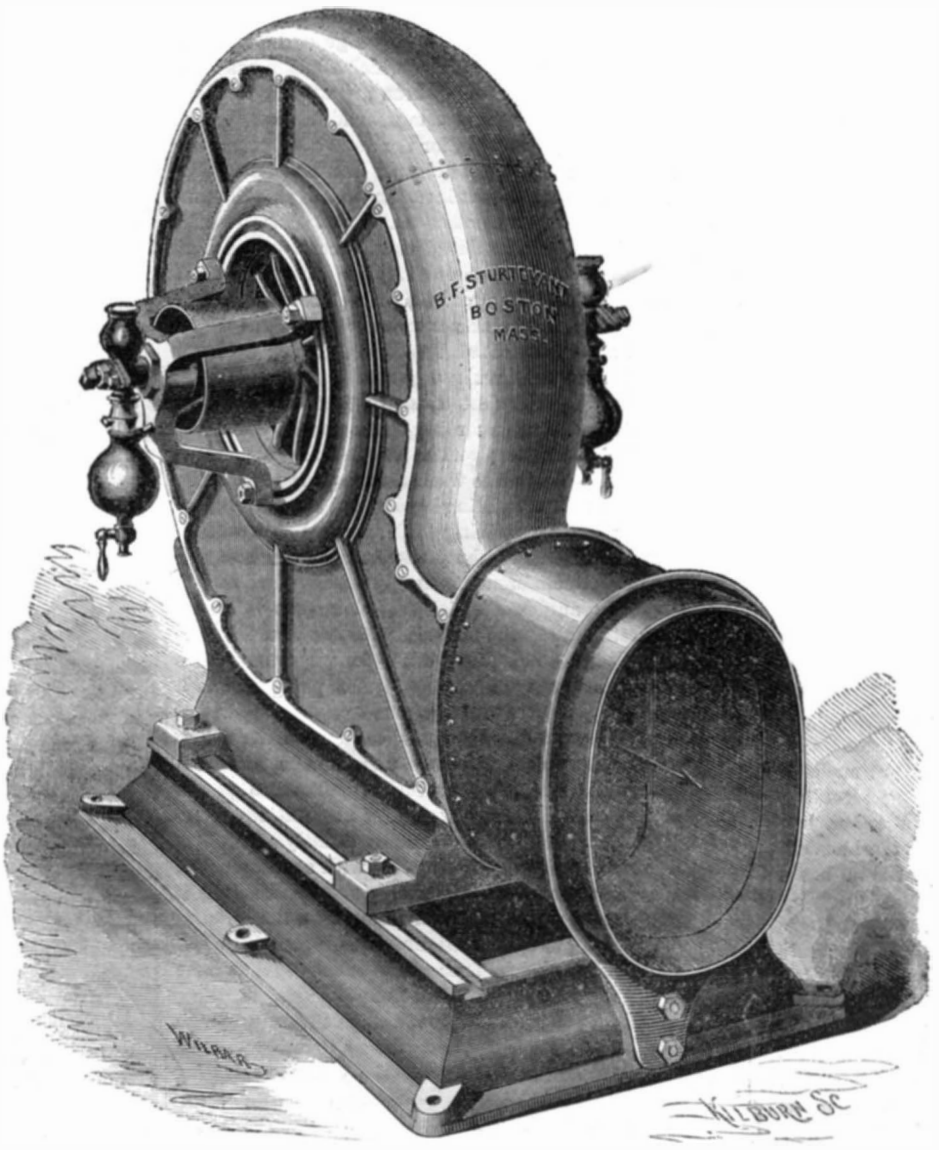
Improvement in Rotary Blowers for Furnaces, Forges, etc.

Experience has proved that in the case of large founderies and forging establishments, where a strong, steady, and well sustained blast is required, great care is necessary in constructing blowers. Delays caused by breaking and the consequent repairs are not infrequently more expensive than the original cost of the blower. The machine should, therefore, be made of the best material; lubrication should be deemed of the first importance; parts liable to the greatest wear should be furnished in duplicates easily put in place, and the workmanship should be of the best quality Such, it is claimed, are the qualifications of the blower shown in the accompanying engravings, a claim that is supported by such men as the engineers of the Charlestown, Mass., Navy Yard; Wm. Mason, the well-known inventor and manufacturer, Taunton, Mass.; Pratt, Whitney & Co., the celebrated tool builders, Hartford, Conn.; O. Ames & Sons, North Easton, Mass.; and by the Rathbone Stove Works, Albany, N. Y.; National Foundery Pipe Works, Pittsburgh, Pa.; Hinkley & Williams' works, Boston, Mass; and a hundred others in all parts of this country and Great Britain,and in Continental Europe. In short, the Sturtevant blower is too generally known and appreciated to require special commendation.

The piston blower or blast engine is complicated and expensive to keep in order, and neither it, nor the ordinary fan blower, gives generally more than one pound pressure to the square inch, while this blower yields one and a half pounds, and is noiseless, perfectly balanced, and not liable to get out of order.

The case of the blower is composed of a series of circular arched sections, forming the periphery, and secured to the side plates by screws, these side plates being braced on on the outside by radial ribs to render impossible any expansion or springing by the pressure of air within. A central aperture is left in these side plate, as ordinarily, which is surrounded by a dovetailed concentric groove for receiving the bolt heads by which the tripod supports to the bearings of the shaft are held. This enables the arms of the tripod or brackets to be adjusted to accommodate the direction of the belt. About this circle or annulus, is formed a scroll-shaped recess intended to diminish resistance.

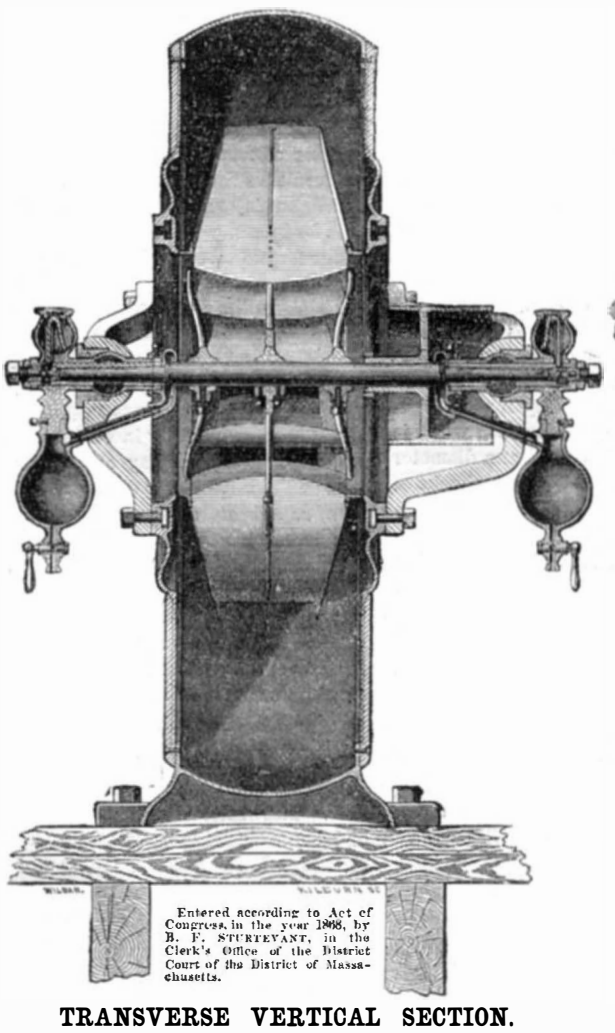


STURTEVANT'S PATENT PRESSURE BLOWER.

The fan or wheel is made with curved floats, to revolve in the direction of their convexity, and of the form of the cross section of a frustrum of a cone. They are connected to curved annuli, or plates, fixed to two yoked wheels, one on either side the fan, intended to form a partition between the air in the case and that in the wheel and to direct the air properly out of the periphery of the wheel. The large air space around the periphery of the wheel affords room for the free discharge of the air from the wheel and prevents noise, which is generally occasioned in common fan blowers by the wheel running in too close a proximity to the inside of the case. Each of the radial arms running from thewheel shaft is fastened to the base of one float, the apex of which is connected to the next arm by a stay or rod, thus holding the floats or blades in place, and preventing longitudinal expansion under high speeds.

The shaft is supported in tubular bearings, sustained in the projecting brackets by means of ball joints, by which the bearings are enabled to accommodate themselves to the shaft while in revolution. The shaft is inclosed in a tubular bushing set up by a screw at its end to adjust the fan transversely. This may be removed to replace the bearing when too much worn. This bushing is bored or cored longitudinally, sufficiently far to meet radial openings opening into an annular chamber, which is fed with oil by the oil cup and wick seen in the enlarged vertical section of bearing and oiler. Around the bearing is a recess in the box which is stuffed with sponge, designed to absorb a portion of the oil that passes from the reservoir at the smaller or outer end of the journal to the larger or inner end. This is sufficient to lubricate the bearing, if, from inattention, the oil cup or reservoir is not kept properly supplied. At the inner extremity of the journal an annular recess in the box receives the superfluous oil and conducts it by a pipe or passage to a receiver under the oiler, from whence it may be drawn off and saved, and prevented from reaching the inside of the case and fouling it, an annoyance that greatly impedes the velocity of the blast in ordinary blowers. This result is further secured by the driving pulley, the web of which is solid and effectually prevents the passage of the oil to the inside of the case. Where the blower case is seated on a bed, as in the engraving, an adjusting screw is attached by which it may be moved to take up the belt. The eduction pipe of the case extends into a stationary flange or collar supported by a standard erected on the base. The pipe for the conveyance of the air to the furnace or forge is fitted upon the collar, and thus the movement of the blower case may be made without disturbing its position. These blowers are used extensively for producing a draft to carry away the dust, hot air, and impure odors from manufacturies of various kinds.

Patented in the United States, England, France, Belgium, and other foreign countries; the home patents being dated Oct. 29, 1867, and Feb. 2, 1869. All orders should be addressed to B. F. Sturtevant, patentee and sole manufacturer, 72 Sudbury st., Boston, Mass.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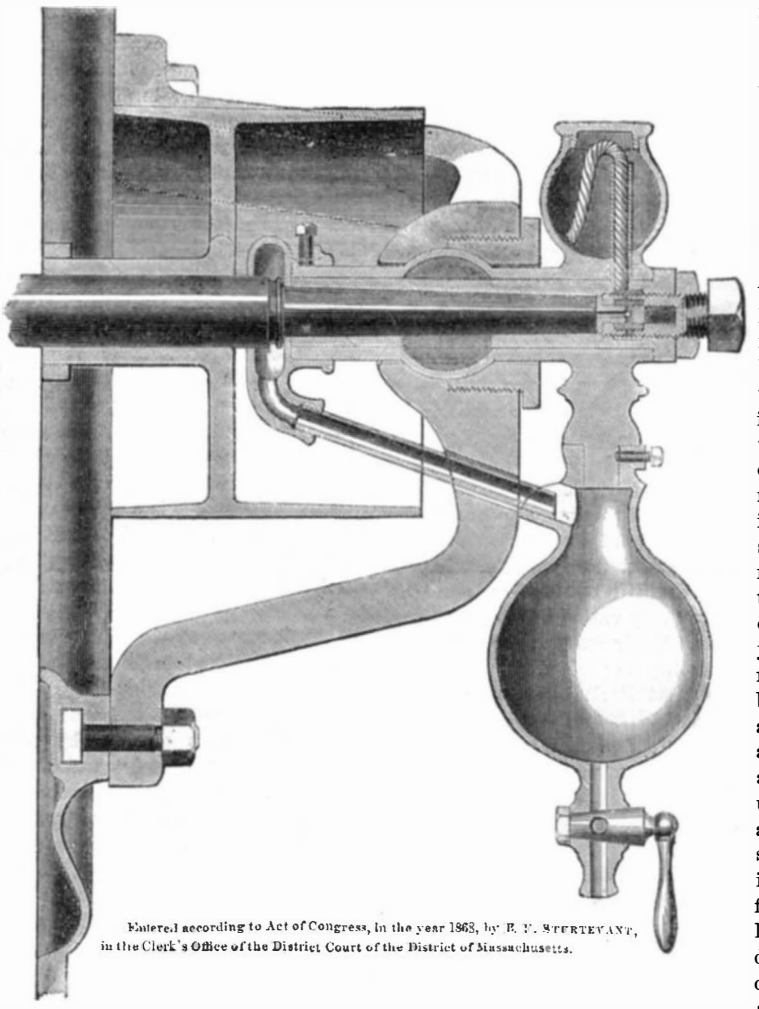
TRANSVERSE VERTICAL SECTION.


Entered according to Act of Congress, in the year 1863, by B. F. STURTEVANT, in the Clerk's Office of the District Court of the District of Massachusetts.

VERTICAL SECTION OF BEARING AND OILER.

Lenses versus Drills.

Mr. John Thompson, of Philadelphia, writes us in regard to the substitution of lenses for drills in perforating rock for blasting and other purposes. He thinks them specially applicable to the Darien excavations for the proposed ship canal, as that locality, being tropical, he thinks,affords greater facilities than more northern localities for the object in view. We have not room for the dissertation upon burning glasses, by which he ingeniously supports his novel proposition, but recommend it to the consideration of those who are interested in the great work alluded to. Could not the same principle be applied to fusing the gold in quartz rock, so that it would run out of a hole and be caught in buckets like maple sap? If any of our readers try the experiment, we shall be pleased to learn the result.

A Natural Mechanic.

From the Rev. Chester Briggs, Columbus, Ohio, we have received a communication inclosing a photograph, the facts of which may interest our readers. It seems that a colored boy about 18 years old, and a slave from birth until liberated by the late war, has built, during his evenings, after laboring daily as a woodchopper, a model of a locomotive and tender combined, about four feet in length and well proportioned. The model is of wood, built by the aid of a few tools—ax, saw,auger, and knife—in the woods,without patterns, drawings, or any instruction whatever. Judging from the photograph, the expression of favorable opinion as to workmanship, and the natural qualifications of the young man, given by experienced mechanics who have examined the model, is fully sustained. The machine is a working model, although, of course,without steam, and is perfectly proportioned in every part.

Mr. Briggs desires to interest liberal men in the case, and procure for this representative of an oppressed race, an education which shall fit him for the sphere for which he seems naturally designed. We commend the case to the lovers of the race. Communications may, we presume, be addressed to Rev. Chester Briggs, Columbus, Ohio.

A NEW ANIMAL, to which Prof. Huxley, of England,has given the name of Bathybius,has been discovered during the operations of laying recent submarine telegraph cables, and other submarine engineering operations. It is gelatinous in consistence, and seems to reside at the bottom of the Atlantic,extending over miles of surface, yet a continuous living mass. It is believed by physiologists to be a gigantic protozoan, and the lowest form of animal life to be found upon our globe. It is also supposed to possess the power of drawing subsistence direct from the mineral world like plants. It is, no doubt, destined, in its classification,to become a bone of contention among naturalists, occupying, as it does, the boundary line between the vegetable and animal world. We may, therefore, expect the Bathybius to occupy a conspicuous place in zoological literature from this time forth.

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A New Single-Wheel Velocipede.

The single-wheel velocipede, which we noticed as an imaginary propeller in our issue of February 13, has received a palpable body and a "local habitation and name" by the enterprise of the inventor of the machine herewith represented. Queer and odd as may be the appearance of the concern, Mr. Hemmings says that his son of thirteen years old propels one of these machines of five feet diameter at a pace that keeps up with good roadsters and does not allow them to pass him. As will be seen by the engraving, the grayhound is not able to keep up with the rider of this novel velocipede, but his master is compelled to reverse his motion and throw the driving friction wheel back of the center of gravity.

The main wheel has a double rim, or has two concentric rims, the inner face of the inner one having a projecting lip for keeping the friction rollers and the friction driver in place, each of these being correspondingly grooved on their peripheries. The frame on which the rider sits sustains these frictions wheels in double parallel arms, on the front one of which is mounted a double pulley, with belts passing to small pulleys on the axis of the driving wheel. This double wheel is driven, as seen, by cranks turned by the hands. The friction of the lower wheel on the surface of the inner rim of the main wheel is the immediate means of propulsion. A small binding wheel, seen between the rider's legs, serves to keep the bands or belts tight. The steering is effected either by inclining the body to one side or the other, or by the foot impinging on the ground, the stirrups being hung low for this purpose. By throwing the weight on these stirrups, the binding wheel may be brought more powerfully down on the belts. Over the rider's head is an awning, and there is also a shield in front of his body to keep the clothes from being soiled by mud and wet. When going forward, the driving wheel is kept slightly forward of the center of gravity by the position of the rider. By this means the power exerted is comparatively small.

A patent for this unique vehicle is now pending through the Scientific American Patent Agency. Further particulars may be obtained by addressing Richard C. Hemmings, at 294 Wallace street, New Haven, Conn.

HEMMINGS' UNICYCLE OR FLYING YANKEE VELOCIPEDE.

TREMPER'S THREE-WHEELED VELOCIPEDE.

The velocipede mania seems to possess all classes, and our inventors are not slow in replying to the demands made upon their ingenuity by improving and perfecting the new vehicle.

The one herewith illustrated appears to be simple enough to be built cheaply, safe enough to commend itself to beginners, swift enough to suit the daring, and convenient enough to meet the demands of short and tall, obese and lean, young and old.

It is a three-wheeled affair, the front wheel being the driver, as usual, but placed so closely to the axle of the hind wheels as to give as complete command over the motions of the machine in turning corners as the two-wheeled velocipede. From the axle of the hind wheels rises a bow-shaped brace, to which is bolted one end of the reach, which is of two parallel pieces of wood, bolted together and embracing between them an upright standard, or pipe, terminating in a forked brace in which the driving wheel turns, and having directly over the wheel's rim, where the forked braces unite, a brake-shoe, or pad. The weight of the driving wheel and part of that of the rider are sustained by a spiral spring, as seen, which serves as a buffer in passing over obstacles. The steering bar—a prolongation of the forked brace—passes up through the hollow standard and is furnished with handles, as usual, on the top. The seat or saddle is sustained by two cast-steel springs secured to the front of the reach by means of a cross strap, or block, and bolt, so that it is easily adjusted further front or rear. So the upright tube may be adjusted in the reach to suit the length of legs or arms of the rider.

This velocipede was designed by John Tremper, who may be addressed at Wilmington, Del.

VELOCIPEDE NOTES.

The velocipede has now fairly conquered the entire world. San Francisco has entered the lists, and we understand has produced some improvements that will, when they are made public, reflect credit upon the ingenuity of its inventors. So much for the Far West. What of the Far East. The Shanghai *News-Letter* states that velocipedes have ceased to be a novelty in the streets of that city, and even the untaught Chinese ponies have become so used to them that they are no longer frightened. A correspondent sends us also a copy of the Japan *Gazette*, published at Yokohama, which states that a gentleman well known in that settlement lately took a trip to Yeddo on a velocipede and returned in safety, meeting with no annoyance on the way. Rumor says that many persons have sent home for these locomotives, and that some are on their way out. Civilization no longer advances solely with the locomotive and telegraph. It has called to its assistance the velocipede.

We find in "Howitt's Visits to Remarkable Places," published in 1841, a description of a velocipede seen by the author during a visit to Alnwick Castle, Northumberland, England, as follows:

"Among the curiosities laid up here are also two velocipedes—machines which, twenty years ago, were for a short period much in vogue. One young man of my acquaintance rode on one of these wooden horses all the way from London to Falkirk, in Scotland, and was requested at various towns to exhibit his management of it to the ladies and gentlemen of the place; he afterwards made a long excursion to France upon it. He was a very adroit velocipedian, and was always very much amused with the circumstance of a gentleman meeting him on the highway by the river side, who, requesting to be allowed to try it, and being shown how he must turn the handle in order to guide it, set off with great spirit, but turning the handle the wrong way, soon found himself hurrying to the edge of the river, where, in his flurry, instead of turning the handle the other way, he began lustily shouting 'woh! woh!' and so crying plunged headlong into the stream. The Duke's horse, which is laid up here for the gratification of posterity, was, I believe, not so very unruly; yet I was told its pranks caused it to be disused and here stabled. It is said that the duke and his physicians used to amuse themselves with careering about the grounds on these steeds; but one day, being somewhere on the terrace, his grace's Trojan steed capsized, and rolled over and over with him down the green bank, much to the amusement of a troop of urchins who were mounted on a wall by the road to witness this novel kind of racing. On this accident the velocipede was laid up in lavender, and a fine specimen of the breed it is. I asked the old porter if the story was true, but he only smiled and said, 'Mind! I did not tell you that. Don't pretend to say, if you write any account of this place, that you had that from me.'"

We herewith reproduce an engraving of an ice velocipede from *Harper's Weekly*. The frame of this velocipede is built like those which are commonly in use in this city. It has but one wheel, steered with a bar as in the land machine, but armed with sharp points to prevent its slipping. Instead of the two wheels behind are two sharp steel runners, like those attached to the ice boats. This velocipede is propelled with astonishing rapidity.

The *Troy Times* gives the following description of a vehicle which has appeared in that city: "The latest vehicular invention (but still like a great many inventions of the earliest known) is the property of a Milesian of this city. He calls it a 'wheelosipede.' It has the advantage of only needing one wheel, and is not only the most useful of this description of vehicle, but absolutely the safest. The operator rests his feet upon the ground, and guides the arrangement by means of a pair of bars. It is capable of being used in building operations, for the conveyance of earth, sand, and such materials, and will doubtless supersede in the end, all the bicycles and other descriptions of velocipedes."

A machine somewhat like the one described by our Trojan cotemporary, has been seen several times in the streets of this city. It has, however, three wheels, one in front and two behind. It is propelled precisely in the same manner as the above, but in turning the front wheel is raised from the ground by the operator throwing his weight more upon the bars than he does at other times. It needs no bridging of gutters; in fact, it is capable of surmounting such obstacles as curbstones, etc., and is coming rapidly into use by porters in delivery of goods.

But while some laugh, as they will at everything new, there are many who regard the velocipede in its improved form as worthy of permanent favor, and who, like ourselves, predict that it will secure it. Whoever visits one of the large halls devoted to instruction in the art of managing these beautiful little vehicles, will, we think, after beholding the ease with which they can be propelled at a rate double or treble that at which a person could walk, admit the decided gain in the application of muscular power attained by them. The following letter, from a scientific gentleman of Philadelphia, is *appropos* to this point and contains good suggestions:

MESSRS. EDITORS:—So far as I have seen or heard of these machines, the real power of the human frame is not brought out by them. They therefore do not afford the measure of use, nor exercise, nor pleasure which they might with a different application of force. Any one who will take a seat in a chair and move his lower limbs as they are exerted in the present velocipede, will see how little power there is in the muscles

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that are thus brought into play. Nature is a good teacher, and she does not teach us to expect much from that movement. The momentum derived from the *weight* of the human body, is a large force; but it is entirely wasted while the man sits down. The arrangement ought to be such as to place him in a standing position, between the fore and aft wheels, his feet playing upon treadles which connect with the axle of the front wheel, his hands upon a cross-bar with the same connection, serving both as a rest and a guide to direct the course. This would be a natural walking motion, but with a vast increase of ease and speed over an ordinary walk, unaided by the rotation of wheels.

If too long continued, it would indeed become merely a treadmill; and, therefore, to afford a pleasant change, the power of the *arms* should be brought in. This force is also lost in the present machines. Let there be, then, a seat provided, into which, after the operater has made his first mile or two by his feet, he may settle down, throwing his feet off the treadles, and, grasping another cross-bar having the crank movement, work himself along, and guide himself pretty much as the children's machine is propelled. When tired of this, the rider would be ready to stand up again.

This double gear would add somewhat to the expense, but a man can afford to pay pretty well for a horse that never eats, and the progress of manufacture must bring down the price. Let this noble recreation, in which a man can be rider, horse, and groom, be open to every suggestion of improvement.

W. E. D.

Another correspondent from Hudson City, New Jersey, has been searching the Scriptures for information upon the velocipede movement, and finds that the cherubs mentioned in the first chapter of Ezekiel were velocipedestrians, and moreover that their machines were of the one-wheeled variety. Acting upon the hint thus obtained he proposes a one-wheeled velocipede, and communicates his ideas to us as follows:

MESSRS. EDITORS:—I notice that all the world have got their heads turned with this new velocipede movement. "I, too," have conceived an idea—a one-wheel idea—suppose a wheel any hight, with broad tire, say twelve inches, of india-rubber, set vertical to a weight hung from the axle to counterbalance the weight of the person sitting over the wheel. The weight might be a sort of pocket, and would answer to carry necessary articles; the other adjuncts might be the same as are usually applied to velocipedes. Of course I do not contend for speed, as a light weight would, I presume, be preferable for that; but for comfort, stability, and ease I fancy it would be the *ne plus ultra*.

I am aware of some drawbacks, but not more for this wheel than for any other of the same kind. I have not made up my mind as to the best method of going up hill. I fear some difficulty. As for going down hill, there would be no trouble. Indeed, I flatter myself it would be "quite a velocipede." Another trouble would be, how to turn a corner. Difficulties of this sort would, I am sure, be got over by dexterity.

It is a rule laid down by some, that nature is the best teacher; if so, a one-wheel movement is rather *outre*. I really cannot call to mind any one thing in nature that would instance a single movement, they are all in pairs or corresponding parts. Still, we are not left without example of a one-wheel movement two thousand years ago, shadowed forth in the dreams of Ezekiel, a true velocipede and locomotive, for the life was in the wheel (see Ezekiel i.); but Ezekiel must have seen the difficulty of turning a corner, for he makes his wheels go straight forward.

This one-wheel movement of Ezekiel is certainly a very bold idea, unless we are to suppose such a thing actually was in use, or that he had seen such a thing. Dreams, as a usual thing, partake of the ideas impressed on the mind by actual existences, and in all the visions (excepting the wheel) the actual existences of nature or art are represented only in contorted or exaggerated fancy. It is true history nowhere mentions a one-wheel movement, but that is not strange; history does not detail the minutiæ of every day life. But if there were no such thing, then, when we consider the many different modes of progression adopted by the ideal, such as clouds, vapors, foam of the sea, the winds, etc.; or the chariots, animals, etc., of less poetic fancy from which he could have chosen a symbol, we are left in wonder at the adoption of so singular a movement for the cherubs.

Even admitting the astronomical allegory, which undoubtedly it is, it does not lesson the singularity of placing living symbolical beings, having feet for progression, upon one wheel instead of two.

W. K. Wyckoff of Ripon, Wisconsin, also writes us that he has demonstrated the working principle of a new velocipede having two wheels which will not overturn even when not in use. It has an adjustable chair seat, for ladies as well as gents, also children, *not astride*. Power is *all* applied both with hands and feet—a shifting axle that can be changed without dismounting, from alternate or reciprocating movements to continuous or simultaneous. Guided with the body of the rider. He wants some one to take hold of the improvement with him.

Messrs. Crawford & Co., of Philadelphia, have opened a school at the N. E. corner of Eighth and Callowhill streets. They write us that they use a bicycle, steered by the hind wheel, it, instead of the fore wheel, being pivoted and connecting with the steering lever by rods running back and connecting with a lever which turns this hind wheel. These rods cross under the saddle, thus rendering the operation of the steering lever the same in direction as in other machines. By this arrangement at least two important advantages are gained; 1st, the front wheel is held steady and does not have a tendency to swing in alternate directions in obedience to the pressure of the feet upon the stirrup rod, in consequence of which fact the lever is much more easily held steady, and beside the wheel never turns against the legs of the rider.

The latest use for which the velocipede has been proposed is that of the *Republican* published at Stillwater, Minn. It says, "We are going to have one if it takes the last cent. We find it necessary to have something of the kind to drum up a few delinquents on our books, and we are too poor to buy a horse, hence this recourse to our ingenuity.

"Needn't laugh, reader, we are going to do it, for we know we can. Any one that can run a newspaper without money can do it, and we have done the latter, any way."

PATENTEES who desire to have the patent claims, as they are issued, can obtain them by inclosing $5 to the Commissioner of Patents at Washington.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

How the "Scientific American" is Regarded at the South---Manufacturing at Petersburgh, Va.

MESSRS. EDITORS:—The annoucement in your paper, of January 30th, that you intend to devote attention during the year to the subject of architecture and building, and the article with illustrations in your last must be very acceptable to the readers of the SCIENTIFIC AMERICAN, and will render it all that the artisan in any department can desire. During the last twenty-four years, the paper has disseminated a vast deal of valuable information, which would not have otherwise reached the mechanics of the country. Its present size and large circulation are proofs that your efforts to make it the paper of the age are fully appreciated. The writer was among the first subscribers, and I have oftentimes found in a single number ideas and information of far more value to me than the price of a years' subscription. Members of my family, not interested in mechanical science, find also interesting reading in it. This being the general verdict, I cannot be accused of attempting a puff, and being unknown to you, have no interest to do so. But I do want to impress upon the minds of the mechanics, here South in particular, the advantage it will be to them to take such a paper as the SCIENTIFIC AMERICAN, if they wish to improve and keep posted in all that pertains to the industrial arts of our country.

Many of your readers are interested in the publication of statistical information of manufactures, such as the report of the President of the Augusta (Ga.), Manufacturing Company, given in full in your paper last month. I noticed it created a little stir here among the manufacturers. Stockholders in the cotton factories went into an examination of balance sheets, etc. There are seven or eight cotton manufacturing establishments in this city and immediate vicinity, which run about 25,000 spindles. Most of them appear to have done well, as I have found by inquiry, and while in search of information to meet the challenge of comparison from Georgia, I visited the Petersburgh Cotton Mill, which has the reputation of being one of the most complete and well-conducted cotton factories in the South. It has been in operation nearly three years, and is filled throughout with improved machinery of American build (except a few pieces). It works admirably, and the excellence of the goods made does credit to the skill and superior taste of our American machine builders. I was told that a gentleman interested in importing foreign machinery, after seeing this factory, said it was folly to send abroad when such results can be obtained from our own make; and I was permitted to copy from the Petersburgh Cotton Mill books the statement which follows. Your readers will readily see that the profits and the success of the Augusta company is not an isolated case. I did not ask permission to state the aggregate amount made by this Petersburgh mill, as those interested, from figures here given, will clearly see that the Petersburgh Cotton Mill has done better in proportion to size of mill.

I find the cotton cost the Augusta Company 19·98c. per lb., and as for wages paid, it cost them to manufacture 7·4c. per lb., or 2¼c. per yard. Their loss from waste was a little over 13 per cent.; their repairs cost over ⅛c. per lb.

I also find the cost of cotton used by the Petersburgh Cotton Mill, during same six months, to be 19·99 cents per lb., and as for wages paid cost to manufacture per lb 6·3 cents, and per yard, 1·53 cents; the loss from waste 10⅝ per cent; cost of repairs, $\frac{1}{9}$ cent per lb.; expense account I find smaller in proportion at the Petersburgh Cotton Mill; taxes and other outside items it is fair to presume, are equal at both places. The Augusta Company, as reported, run 505 looms, employing 507 hands, and turn off an average of 49 yards to a loom daily. This Petersburgh mill has 100 looms, employing 98 hands, and has averaged 46 yards to loom per day. The difference in production of looms is accounted for thus: The Petersburgh Cotton Mill makes fine sheetings, shirtings, and drilling, closer picked, and command a higher price consequently per lb. It may appear singular to see the price paid for cotton so near the same; it is owing partly to both parties using cotton grown near their respective factories; and although the Augusta Company got a better grade of cotton there at same cost, their loss in waste for working it exceeds that of the Petersburgh Cotton Mill by nearly three per cent, which is no small item when cotton is high. From the foregoing statements it must be evident that the Petersburgh mill has a larger margin for profits, with the exception of ·01 part of a cent per lb. in cost of cotton, every item in the process of manufacture is below that of the Augusta Company's report. I state this not in a disparaging spirit, as this statement shows the Petersburgh Cotton Mill must have a great advantage from having all new machinery in use. With this fact before us, I am not disposed to pluck the laurels from the brow of our Augusta friends.

Manufacturing South can be made a decided success. The fine water powers in this place, Richmond and Fredericksburgh, together with our climatic advantages, are unsurpassed, and offer rare inducement to men of capital and enterprise to settle in this old State of ours. VIRGINIA.

Petersburgh, Va.

Gas from Gasoline more Dangerous than Coal Gas.

MESSRS. EDITORS:—A correspondent (page 86, current volume), wants, "in justice to the gas machine men," an article on gas machines, or gas from gasoline. As I myself am the patentee of such a machine, and a very successful one, too, I might be supposed to belong to this class of men, and, therefore, cannot be suspected of being prejudiced against the gas machine. However, in justice to the truth, I must confess my conviction that the gas from gasoline produced by the so-called gas machines, is more dangerous than coal gas; this conviction is founded on theory and experience. The latter I need not describe; we see almost every day in the papers the results of explosions produced by the intermixture of air with the more volatile products of petroleum, supposed to be removed by the distillation, but which are seldom sufficiently removed to make the so-called kerosene perfectly safe, or what is worse, they are, for their cheapness' sake, intentionally introduced by the dealers or retailers. The explosions produced by coal gas are comparatively very rare.

The causes that gasoline vapors are more dangerous than coal gas are the following:

1. It takes a less quantity of gasoline vapor to make with air an explosive mixture than it takes of coal gas.

2. As gasoline vapor is heavier than air, it will fall to the ground and collect there; coal gas, however, is lighter than air, therefore it will ascend, and be more likely to escape through the air holes of the cellar, which are always at the top, and therefore give no occasion to the heavy gasoline vapors to escape, therefore they will collect.

3. Coal gas will be detected by a strong smell, even when the smallest quantity is present a fraction of one per cent makes its presence known, therefore, long before the mixture with air has become inflammable. Gasoline gas has not the disagreeable smell, the smell is also weaker, and is so customary in localities where this gas is used that its presence does not arouse any suspicion.

4. The coal gas has a strongly diffusive power in relation to atmospheric air, and will therefore be soon removed from the source where it escapes; gasoline gas, on the contrary, has little of this diffusive power, and may form an invisible layer of say one foot high at the bottom of the cellar, which may remain there for hours, when the air is not stirred, very slowly mixing with the air, and ready to explode at the moment of contact with light.

We must, therefore, conclude that to diminish the danger of explosions when gasoline gas is used, open air holes must be made at the bottom of the room, and when coal gas is used, at the top, in order to provide an effective means of escape to explosive mixtures of gas and atmospheric air. In both cases, however, openings are also required to admit air at the opposite ends of the room, in order to replace the escaping gas by fresh air, in short, all rooms where there is danger of collecting inflammable gases or explosive mixtures of these gases with atmospheric air, should be thoroughly ventilated. P. H. VANDER WEYDE, M. D.

New York city.

To Ascertain the Power of a Microscope.

MESSRS. EDITORS:—If your correspondent G. W. M., by his question on the 108th page of your issue of February 18th, means to ask how to find what is the power of a given microscope, the following method may assist him: Place a small object of known length, say from 1-20th to 1-50th of an inch on the stage of the microscope, and looking at this through the instrument with one eye, with the other look at a foot rule held at the level of the stage. With a little practice both may be seen at once, when, by dividing the space apparently occupied by the object on the scale, by the known length of the object, the magnifying power will be obtained.

If the power is very high, the best object to use is a glass micrometer, which may be purchased for a dollar or two, of any optician, with lines ruled on it to hundredths or thousandths of an inch.

The power of a telescope may be found in a similar manner by nailing a square of white paper an inch in diameter on a board fence or the side of a building. This square, seen through the telescope, will cover a considerable space on the fence as seen by the unoccupied eye.

This distance reduced to inches will show the power of the instrument as before. A little difficulty is sometimes found in seeing both objects at once, but this is soon overcome, and the method has the great advantage of not requiring the separation of the lenses or any knowledge of the mode of their combination, which varies with different opticians.

Middletown, Conn. W. E. HULBERT.

A California Saw Mill.

MESSRS. EDITORS:—Possibly the following may be of interest to your readers; at least it will give them an idea of our sawing business here. Our engine is 14 inches diameter by 18 inches stroke, running 130 revolutions per minute with 90 pounds of steam; built extra strong with large bearings; fly wheel 8½ feet diameter, weight 3,350 pounds, carrying a 16-inch rubber belt direct to saw arbor. Boilers, two in number, 42 inches diameter by 20 feet long, with two 14-inch flues. Smoke stack 30 inches diameter and 40 feet high.

This engine drives one 60-inch and one 50-inch double circular saws, one edger, one siding saw, one cutting-off, one picket, one lath saw, Hendy's gang saws (four to six) running horizontal and cutting into the solid log from one to four inches, one Putnam planing machine, beside grindstones, sawdust carriers, engine lathe, and wood-turning lathe. With full head of steam all the above machinery can be driven at the same time.

The edger and planing machine are driven from a shaft coupled on the end of the main saw arbor. We use Dunbar's piston packing and the Giffard injector. Our object in arrangement of machinery was to have as few parts as possible, and everything direct acting. We cut 6,000,000 feet of lumber per year and have done so for the past two years. Five-sixths of it were redwood, and one-sixth pine which is very hard. The redwood is quite soft, something like eastern pine. We use Spaulding's patent tooth saws, excellent for the sort of timber cut here. T. REEVES.

Little River Mill, Little River, Mendocino Co., Cal.

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The Crank and Rotary.

MESSRS. EDITORS:—My proposition to you in my first communication was substantially as follows: 50 square inches of piston area and 80 lbs. of steam, 24-inch stroke, 100 revolutions per minute, creating 4,000 lbs. exertive force, less the friction, at the point of half stroke. What number of square inches of piston area will equal the above, if applied six-sevenths of the entire circle, under same pressure of steam and same leverage of crank? In your editorial comments on page 54, current Vol. SCIENTIFIC AMERICAN, I find, first, that if I had been a constant subscriber to the SCIENTIFIC AMERICAN I would not have attempted to enter upon a path which has proved a failure to so many others, etc. In reply to this I would say that I now have, bound and unbound, in my house more volumes of the SCIENTIFIC AMERICAN, than the editor would be able to stand under if they were piled upon his shoulders. Second, that I imagine a rotary engine. Here I beg to differ from you; I have a perfect engine all finished. Third, the steam must impinge upon the crank with equal force at every point in its revolution; here again I differ with you. I said six-sevenths of the entire circle. There again you say this cannot be done with the crank. If I apply the force 12 inches from center of main shaft and continue that force as stated above, is it not virtually a crank? You seem to have no faith in the crank's ever being economically superceded; I think different. If you have a propulsive force at the point of half stroke in the above described engine, you certainly have no force at either of the dead centers. Suppose 4,000 lbs. exertive force is applied to the crank pin at half stroke (12-inch crank) now drop this crank pin just half way towards the center of main shaft, and still keep the same force applied. Is it now any better than 2,000 lbs. would be at its original position, and again has not a crank more power, going from the center to the point of half stroke, than it has going from the half stroke to the opposite center? I consider eight twenty-fourths of the entire circle of the crank of very little value; three twenty-fourths going to the center and one twenty-fourth from it; this makes one-third very little power one-third medium, and one-third most energetic. You saw fit to publish my first communication, and criticised it most severely. Why not publish this one and give me a chance to be heard? In due time I expect to call at your office with my engine, and I anticipate no difficulty in convincing you that the favorable notice which you have promised is richly my due.

J. W. H.

Decorah, Iowa.

[We are ready to be convinced, and sincerely hope our correspondent may succeed in his attempt.—EDS.

Is the Yearly Number of Earthquakes Increasing?

MESSRS. EDITORS:—I have inquired of the *Tribune* if earthquakes were increasing, and how many such phenomena did occur during the past two years. It is mum. The same inquiry put to the *Evening Post* brings out an indefinite and unsatisfactory reply. You said in your January number that 1868 would be remembered as "the earthquake year." So says the *Boston Traveler*, etc. Now MM. Perry and Ansted record 3,240 earthquakes in fifty years, from 1800 to 1850, which is on the average nearly sixty-five each year. At this annual ratio some over 1,000 must have occurred in the sixteen years from 1850 to 1866. As over 7,000 are tabulated previous to 1850, the number down to 1866 must be considerably over 8,000. I now inquire how many earthquakes occurred in 1867? How many in 1868? What is counted as an earthquake, the whole number of shocks including the first principal shock, or is each distinct shock recorded as one earthquake? Nineteen shocks occured in California—were these nineteen earthquakes or one earthquake? Is there no record of the number occurring in America since its discovery and settlement? Is there no beam of information in the United States on this subject? Prof. E. Merriam, when living, kept a yearly record of these mundane convulsions: is there any kept since his death? My meager records give over thirty-five hundred shocks as occurring during the years 1867 and 1868. Are earthquakes increasing or not? What says the scientist? Light is wanted by

D. T. T——R.

Rouses Point, N. Y.

[No very definite and reliable data as to the exact number of earthquakes which annually occur can well be obtained. Any slight convulsion of the earth's surface must be counted as an earthquake, but when a rapid succession of these occur, we believe they are counted as one. The reason why 1868 will be remembered as the "Earthquake Year" is because the convulsions were so general, violent, and disastrous, rather the number which took place, which may or may not have been greater than during many previous years not particularly noted for earthquakes.—EDS.

Good Remedy for Seasickness.

MESSRS. EDITORS:—In your number of Nov. 25, 1868, are seven rules by which seasickness may be avoided, which you credit to the *Medical Gazette*. If I had to go through the programme laid down in that article I think I'd stay at home, as the pleasure of a sea voyage would be materially diminished. I've been a traveler for twenty years, by sea when necessary, and always more or less seasick the first day or two out, with the exception of one voyage. A day or two before leaving Paris, in Dec. 1867, a friend asked me if I was subject to seasickness. I answered, "Yes, a little." "Well," said he, "try my remedy for it. It may prevent it entirely, and is at least worth trying." He handed me a dozen "little pills" of the homeopathic "persuasion." and said, "Here are two doses, take one dose when you get under way at sea and, if nausea comes on, take the second. If the two doses don't stop it there will be no use in taking more." I stuck the little paper of pills in my vest pocket and came over to England and spent the Christmas holidays at an English "home." If you ever spent Christmas in England, you know that the second rule laid down by the *Medical Gazette*, namely, to "eat a hearty meal before going aboard," has to be practiced pretty often during Christmas week. I thought myself in fine condition to be very seasick and expected to pay old Neptune dearly for the good things taken at my friend's table. I sailed from Liverpool on the 29th Dec., and when fairly in the channel took my first dose of "little pills." The wind was fresh and New Year's morning dawned with as terrific a gale as ever swept the Atlantic. Another met us on the 6th of Jan. 1868. Every passenger on board but myself was more or less sick. I escaped entirely through both storms, and if the "little pills" were not the cause I am at a loss what to ascribe it to. They were *sugar of milk medicated* with *petroleum*—nothing more. If voyagers try the *Gazette's* seven rules and they fail, I would advise a trial of the "little pills" next time, for it will take all one voyage to go through the rules.

Yellville, Ark. E. A. PHILLIPS.

The Blue Color of the Skies.

MESSRS. EDITORS:—Rays of light, however brilliant they may be, are invisible when they pass through a dark room, or any other dark place, unless they are arrested, held, and refracted by some substantial thing. Now, the space intervening between the earth and the sun, and all other spheres, is an absolute void, excepting the distance reached by the earth's atmosphere. Through this immense space, and through all space not occupied by matter, the sun penetrates with its bright rays; yet, utter darkness—intense blackness—occupies and prevails in all this void, because there is no matter or thing therein to arrest, hold, and refract rays of light. Were it possible that one could be placed at a point midway between the earth and the sun, nothing could be seen other than spark-like spheres bedecking a black firmament in all directions. All these, even the sun, would appear only as bright balls of light, with or without radiation, just as light appears to the mariner through the darkness of night. The appearance of this darkness—this blackness, is modified to our sight here by the halo caused by refracted light from objects immediately surrounding us on the surface of the earth and from vapors in the earth's atmosphere; and it is this modified blackness which causes the apparent blue color of the skies.

RICHARD A. WHITMORE.

Poisonous Odors.

L'Union Medicale is very positive on the subject of the deleterious action exercised by the perfume of flowers, especialiy such as lilac, jessamine, hyacinth, tuberose, on persons who have the imprudence to leave them at night in the bed-chamber. The more or less fictitious cases of suicide and assasination, which have been related under this head, should not induce us to doubt the reality of the asphyxiating power possessed by strongly smelling flowers. Certain odoriferous fruits share the same deleterious property.

We read in the *Union Bourguignon* of Dyon, that a grocer who had slept in a small rooom, in which the contents of three chests of oranges had been piled up, was found asphyxiated in the morning, and was only resuscitated by the most energetic treatment.

Our readers will also recollect a case not long since reported of death resulting from the odor of quinces, which occurred from sleeping in a room where a large quantity of them were kept.

Extinguishing Kerosene Lamps.

MESSRS. EDITORS:—I see in answer to correspondents, No 8, present Vol. you advise your readers that "to extinguish a kerosene lamp safely, turn the wick down until the flame is low and blow under the glass." You will find it requires pretty strong blowing and some practice, in order to do it quickly.

Permit me to submit the following which is free from danger, and is instantaneous: Turn the wick up so as to produce a large flame, but not high enough to smoke; then blow squarely *across* (not down) the top of the chimney.

In explanation: A strong current of air across the top of the chimney produces a corresponding current up through the chimney; the latter current lifts the flame off from the wick and instantly extinguishes it.

Atlanta, Ga. J. C. DODGE.

Power Required is as the Square of Velocity.

MESSRS. EDITORS:—T. W. Bakewell, on page 119, current Vol., says it would require eight times the steam to propel a boat from New York to Liverpool in five days that it would if 10 days were occupied," in the preceding sentence, however, he says, "it would require only four times the coal or steam." These two statements are so diametrically opposed, that however plain the solution may be to him, it is difficult for any reader to ascertain his real meaning. He admits that resistance for any given distance increases as the square, and of course four times is correct. The source of his error is that while he counts double the velocity of piston and wheel, he omits the important item of the time occupied, being only one-half, which he would not have done had he been a more accurate

MATHEMATICIAN.

The Hydrogen Gas Theory.

MESSRS. EDITORS:—Under heading "The Hydrogen Gas Theory," on page 86, current volume of SCIENTIFIC AMERICAN, you take issue with the views expressed by your correspondent (W. H. L.), and your principal ground or argument for so doing is that hydrogen gas is not explosive or in other words, cannot be ignited without the presence of oxygen. So far I believe you are entirely right for combustion is nothing more than the chemical combination of two or more substances, and cannot take place independently of atmospheric air, oxygen gas, or any of the other bodies usually called supporters of combustion. But, admitting that there can be hydrogen gas in steam boilers at any time, there must be also oxygen gas, for the hydrogen gas must necessarily have been generated from the water or steam, and its equivalent of oxygen must have been created at the same time, for it is well known that water cannot be decomposed and one of its component gases extracted from it, as it were, without at the same time liberating or generating its equivalent of the other gas, that is, for every part (in weight) of hydrogen gas generated, there must also be generated eight parts of oxygen or *vice versa*.

The theory advocated by your correspondent—the explosion of boilers by the presence of hydrogen gas—does not seem at all improbable to me, and this I say with due deference to your opinion. My reasons are these:

Electricity is manifested during changes of state in bodies, such as evaporation, condensation, etc. There must be, then, more or less electricity evolved by the generation of steam in the boiler. Electricity, on the other hand, has the power, is in fact, one of the most powerful means under known circumstances of decomposing water; it does not, therefore, seem unreasonable to suppose such conditions may exist in the case of a boiler with a heavy head of steam on, perhaps very little water in, and an intensely hot fire under, and that a large quantity of electricity may be evolved, and a certain quantity of water or steam thereby decomposed. If this should be the case (and it might probably be experimentally ascertained) the smallest leak in one of the flues or in the boiler itself, might cause the oxygen or hydrogen gases to be ignited, and the necessary consequence would be a terrific explosion.

The above views, although presented in a crude manner, may perhaps account for those extraordinary cases of boiler explosion, which to the present time have remained, as far as I know, without satisfactory explanation.

St. Louis, Mo. R. DESBONNE.

Product of a Charcoal Furnace.

MESSRS. EDITORS:—It may be a matter of interest to your readers to know what can be done, or, more properly, what has been done by a charcoal furnace.

Our furnace, at this place, a hot-blast charcoal furnace, meaures 40 feet in height and 9½ feet in the bosh. During the month of January last, it made 784 tuns of pig-iron, of 2,268 lbs. to the tuns. This, I believe, is about 25 per cent more than any other charcoal furnace has ever produced in the same length of time. If I am in error in regard to the comparative amount, I hope to be corrected and informed of the name of the furnace and the date of manufactnre.

This result has been attained without in any way forcing the furnace and on 106 bushels of coal to the tun of iron produced.

EDWIN HARRISON.

Irondale, Mo.

What is the Reason?

MESSRS. EDITORS:—What is the reason that a 3½ or 4-inch crank pin is strong enough for an outside connected engine, while an inside connected one requires a six-inch pin, and often breaks them of that size? Who knows?

EGBERT P. WATSON.

New York city.

A Report on Ordnance.

The report of the Joint Committee on Ordnance, made in the Senate by Mr. Howard, condemns both the Rodman system of gun making, adopted in the army, and the Dahlgren system, which is used in the navy. These systems, the report says, while partially successful with smooth bores, have uniformly failed as rifles. Several of the Rodman guns have burst spontaneously while being finished in the founderies. The Committee recommend that no more of them be purchased, but that experiments be made to determine upon some more reliable system of fabrication. The failure to secure better guns heretofore, the Committee attribute to the fact that officials have been gun inventors and have secured by their influence the adoption of their inventions without regard to merit. The report is accompanied by a bill which places all experiments and the selection of arms for both army and navy in the hands of an Ordnance Commission, to be composed of three army and two navy officers, and two civilians eminent for their attainments on the subject. The bill abolishes the Ordnance Department of the army by merging it in the artillery. This report assumes unusual importance in view of the fact that the Ordnance Department has asked for appropriations to purchase over 1,900 heavy guns made on the Rodman plan, for armament of the fortifications.

VALUE OF PATENTS IN ENGLAND.—An English circular states that an American patentee of a device for dressing millstones by a revolving diamond, has realized over one million dollars; and the estimated value of the patent for the next ten years is put down at five millions. This statement is put forth by a patent agency in London for the purpose of exciting English business, and may therefore be accepted with some grains of allowance, but we do not doubt that there are many American inventions that would pay well in England and France if properly managed.

IT is announced that the trains on the Central Pacific Railroad have been delayed in the Sierra Nevada mountains by one of the most terrific snow storms known in that region. The snow belt extended over eighty miles; the usual distance is about fifty. The snow-sheds withstood the storm, where completed, and furnished full protection to the road.

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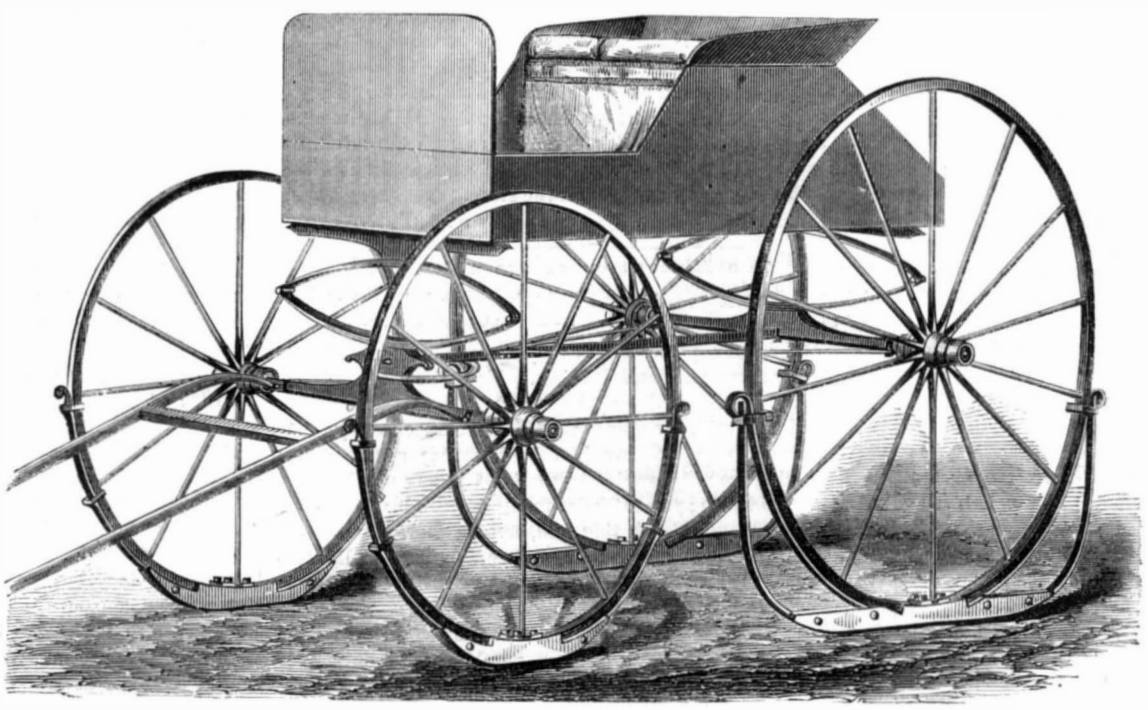
Improved Device for Converting a Wheeled Vehicle into a Sleigh.

It is not uncommon to see a sled attachment to wheeled vehicles suspended to the axletree and held from turning by means of a strap or chain-lock; but as in this case the resistance to transverse motion must be borne entirely by the axle, which is only a single point, the strain is too great at this single point.

The engraving gives a view of a plan that seems to avoid this objectionable feature. It consists simply of a shoe attached to each wheel by means of spring straps held to the fellocs of the rim by ordinary clips, and secured at their centers by a plate embracing one spoke, secured by bolts or screws to the projections of the shoe, which lap on each side of the wheel rim. For purposes of appearance and additional security from turning, spring braces, as seen on the hind wheels, may be added, although, if the shoes are made long enough, there can be no danger of their turning, or of the wheel revolving. It will be plainly seen that the strain is divided by being placed on the rim rather than the axle of the wheel. The device can be readily attached or detached as may be desired, and when detached is so compact and portable that it can be carried in the boot, or under the seat of the vehicle, to be ready for use when needed.



STONEBANK'S PATENT SLEIGH ATTACHMENT.

This device was patented through the Scientific American Patent Agency, December 29, 1868, by Joseph Stonebanks, who may be addressed at College Point, Queens county, N. Y.

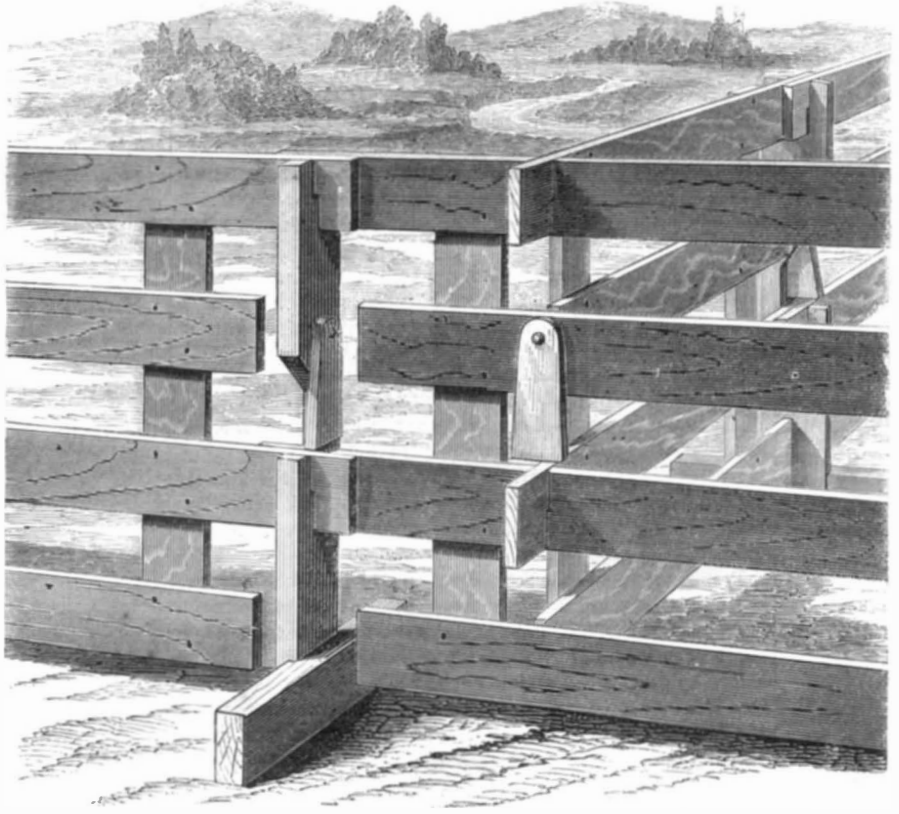
Improvement in Portable Fences.

For herding cattle and other stock, and for other purposes, a temporary and movable fence is a great desideratum; one that can be easily placed in position and taken down, light, strong, and portable. Such is that shown in the accompanying engraving. It may be made, as represented, of horizontal strips, or in the form of a picket fence, as desired; in the latter case, the stringers being mortised, or cut, as are the first and third bars in the horizontal strip fence.

The posts are uprights, of board or plank, recessed at the top and at a point to receive one of the lower bars, and nailed or screwed to a horizontal piece resting on the ground. The bars of the fence sections are mortised or halved, and fit into the corresponding recesses of the posts, as plainly seen in the engraving. They are firmly held by means of simple buttons secured to the bars, one to each section. The sections may be set either in straight lines or at angles of any grade, as required, to inclose a plot of ground rectangular, or of any form approaching a circle.

The portability and the ease of management of this fence is quite obvious.

Patented through the Scientific American Patent Agency, Dec. 29, 1868. Communications should be addressed to Coolidge & Rollins, Jersey Mills, Pa.



COOLIDGE & ROLLINS' PATENT PORTABLE FENCE.

Discoveries in the North Sea.

The results of the dredging expedition recently made by Dr. Carpenter and Professor Wyville Thomson in the North Sea are very interesting. In the first place they discovered that at 200 fathoms, at least, animal life exists. At nearly a mile deep it is abundant; at that depth animals are as well developed as at the surface, beside they are not confined to the lower groups; the whole of the invertebræ are well represented. They also found that the temperature is not dependent on depth; even in places quite contiguous to each other the temperature was not uniform. In the deep waters between the Faroe and Shetland Isles, and to the westward, they find a formation being deposited which is exceedingly like chalk, and contains similar or identical fossils. The fauna differed somewhat with the temperature. The bottom of the sea to the westward of the islands named consisted of ooze, or shining mud, of the consistency of thick treacle, of a pale grey colour; this was full of sponges of the most extraordinary kinds, and of very singular forms. During six weeks the explorers only got five days of good weather.

TRANSMUTATION OF METALS.

Long ago when chemistry had not yet attained the full stature of a science, the belief that there existed in nature a substance—a veritable philosopher's stone—which would transmute all the baser metals into gold, was generally entertained by the alchemists. It is no wonder that such an opinion should have obtained. Phenomena just as remarkable were known to occur, and still daily occur, in the experience of every chemist.

The alchemist, although knowing nothing of the elements as we now recognize them, regarded the baser metals as containing the same elementary substance as gold, associated with impurities which they had not yet learned to separate from them, and at this day no chemist is so bold as to dispute the *possibility* that the noble metals are composed of substances to be found yet in the baser ones. The late lamented Prof. Faraday professed his belief in the possibility of transmutation, and even asserted that he had experimented with a view to discovering a method whereby it might be accomplished.

Although in the present state of science no chemist can say that lead and gold do *not* contain the same elements, the general belief is that they do not; and we do not assert that any believe that the baser metals can be converted into gold or even into other metals, by direct chemical reaction. There is good reason to believe, however, that many substances, which hitherto have been treated as elementary in character, simply because it has yet been impossible to *prove* them otherwise, will yet be found to be compounds.

The peculiar property, called by chemists, allotropism, is one of the foundations of this belief. That substances essentially the same should be capable of existing in several distinct conditions possessing qualities not only widely different, but sometimes directly opposite, is contrary to all analogy, and it is admitted as a fact only because it *appears* at present to be true. Charcoal, plumbago, diamond, are called allotropic forms of carbon, because all that chemical science has hitherto been able to accomplish is to show that they contain the substance we call carbon. Whether carbon is a compound remains to be proved. That it is not a compound seems, according to all present knowledge, impossible to prove.

But carbon is not alone in its manifestation of this remarkable property. Sulphur, phosphorus, silicon, boron, oxygen, are in the same category. Hydrogen, hitherto suspected of being a metal, comes out now in its true colors, and has received the new name of hydrogenium in consequence.

Ammonium, known to be a compound, also has the characters of a metal, as is most strikingly shown by its amalgamation with mercury. Such a fact, known as it has been for a long time, to chemists, must have had its influence in restoring the belief that the transmutation of metals is possible.

We believe that we express the common opinion entertained by chemists in general, when we say that this consummasion is no longer regarded as a chimera, but as something to be expected.

We are, doubtless, on the eve of great discoveries. The attention of chemists has been somewhat diverted from the study of inorganic chemistry by the alluring field of organic research, from which a most abundant and rich harvest of knowledge has been already reaped. We see signs of a reaction in this respect, and shall look for great results during the next decade.

The investigations of the real cause of the phenomena of allotropism we believe to be a promising one, and the discovery of that cause would mark the commencement of an era in science brilliant beyond the power of conception.

Patent Office Contract Swindle.

We have before us a printed statement by Messrs. James, Norris & Peters, to explain their action as a Committee appointed by the Secretary of the Interior to examine into the truth of the charges made by the Commissioner of Patents in relation to the swindling stationary contracts to which we referred in a recent number. The committee attempt to exculpate themselves by referring to the peculiar order of the Secretary, which limited them to certain particulars and without the power to coerce the attendance of witnesses, or to put such as did appear under oath. As might be expected under such circumstances, the report of the committee amounted to nothing, and it was simply a waste of time to set them at work merely to find out that Ex-Commissioner Theaker, and Acting Commissioner Stout were paying Dempsey & O'Toole about the same prices for similar articles supplied by Philip & Solomon. The Committee did not go into an investigation of the market value of the articles supplied in the schedule. Neither did they undertake to find out that the articles had all been delivered. It seems to have been the intention of the Secretary of the Interior to make a farce of this investigation, and he appears to have known how best to reach that result.

Patent Case---Giffard's Injector.

A case is now on trial at Philadelphia, before Judge Cadwalader, for an infringement of the Giffard injector patent, against Samuel Rue and others.

The bill sets forth that Henry Giffard invented an improvement in a feed-water apparatus for steam boilers, and on the 24th of April, 1860, obtained a patent for the sale of it in the United States. On July 7th, 1860, he sold the patent to the plaintiffs, Sellers, who thereupon had exclusive right to it, and they complain that the defendants have wrongfully obtained a patent for a similar injector, which is simply an infringement upon their patent, and are manufacturing and selling the same; for which reason they prayed the Court to grant an injunction against the defendants to restrain them from proceeding in the manufacture and sale of the said articles. The defendants answered and maintained that the patent under which they claimed was genuine, and the article they sold was an invention entirely distinct from that of the plaintiffs. This is an interesting case, and we shall watch for the decision.

Stephen Pearl Andrews, of New York, asks our opinion of his so-called science of "Universology," the title of a book he is about to publish. From what we gather from his prospectus—the only means of information at hand—we can give no opinion, as that merely states that the author has discovered the foundation of all science, or the science of sciences, and also the elements of a universal language. What benefit either of these discoveries—if made—can be to the race, we cannot conjecture. We hope the book itself will be clearer than its prospectus.

Commissioner Foote, in his endeavors to bring about reforms in the Patent Office, should not forget that the greatest source of annoyance to applicants for patents, at the present moment, is the vexatious delay attending the examination of cases. The Patent Office cannot realize the highest hopes of its patrons until examinations are more energetically disposed of.

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TRIALS AND TRIUMPHS OF INVENTORS.

"Necessity is the mother of Invention," saith the proverb. In many cases, the meaning of this pithy sentence has been reversed and Invention has proved the mother of Necessity. Of all the long line of illustrious men, whose works still live, and will continue to exert their beneficial effects upon the welfare of mankind, none have been so sorely tried, none have achieved more glorious victories, than inventors. High birth, extensive learning, or even wealth, have not purchased immunity from superstitious persecution, from contumely, nor from poverty and neglect.

The age has past when a Galileo was brought before an ecclesiastical bar to answer for heresy, because, forsooth, he had demonstrated a great truth which conflicted with the superstitions of the time; but the difficulties resulting from limited means and facilities, from deficient material, and the demands upon time and mental energy in the struggle for subsistence still remain to embarrass and fetter the modern inventor. Many are unequal to the contest and cease further effort, leaving, doubtless, valuable ideas partially developed, which from thenceforth become to them like household treasures forever buried out of sight.

We have seen many such in our experience and expect to see many more. We sympathize with, while we admire them; for be it remembered, that fidelity to an idea once conceived is a mark of true greatness. Your great inventor makes pecuniary reward always secondary. The successful demonstration of the truth of his conception is the paramount motive with him. It was, we think, the great architect, Inigo Jones who remarked regretfully in his old age, that he never had done his best; that there had always been some limiting circumstance of cost, or site, or dimensions, or whim on the part of others, that had confined his powers, so that the beautiful and masterly conceptions of which he felt himself capable had never been produced.

We have said that many inventors are unequal to the contest with adverse circumstances. That this is so does not prove them all weak. Many are strong, but cruel circumstances are stronger. Pallissy, whose fame rests no more upon his succeesful imitation of the Italian pottery, than his long struggle through sixteen years of unprecedented trial, would have succumbed to blindness had that been added to his other misfortunes of imprisonment and poverty. Though he burned his chairs for fuel to bake his experimental wares, and suffered pangs which only those can feel who hear the unanswered cries of loved ones for bread, and yet held out stoutly, he might have given up in despair, if an angry nerve had risen in rebellion against overtaxed energy, and added the physical pain of *tic doloreaux* to his sum of afflictions. Arkwright, first barber, finally a knight of the realm, capable of separation from a wife who, lacking faith in his ideas, and lacking household comforts which a more close application to shaving would have procured, broke his models, might have yielded to other obstacles.

It is worthy of note, however, that those who have been most sorely tried and who have been able to endure to the end, have triumphed most signally. Of such many illustrious modern examples, as well as those of a past age, might be cited. One learns something of the value of pluck in reading the histories of these great men, who engaged not only in a conflict with untoward circumstances, with doubting cavillers, and personal afflictions, have with one hand held them all at bay, while with the other, they have wrested from Nature a response to their demands. Even the demand upon physical courage has been met by this class of men as much as by any other. There are men who walk our streets with faces scarred by explosions, with mutilated limbs, and broken constitutions, resulting from voluntary risks taken in the pursuance of some new truth that should benefit their race.

What space would be required to record the sublime achievements of these much tried and long suffering benefactors of mankind. The civilization and even Christianization of the world has been forwarded as much by their aid as by any other human means.

It is to them we owe our cheap Bibles as well as cheap transportation; the means of rapidly distributing the bread of life to those that sit in darkness.

In the future the names of these shall stand like fixed stars perpetually shining, while those brilliant meteors which have dazzled the gaze of past and present ages, by the red blaze of military glory, shall have gone out forever.

THE DARIEN SHIP CANAL---WATER COMMUNICATION BETWEEN THE ATLANTIC AND PACIFIC.

Hon. Caleb Cushing has returned from the capital of Colombia, the most northern of the South American republics, whither he was sent by the Department of State, and the draft of a treaty he there negotiated for the right of way, etc., of a ship canal across the Isthmus of Darien, or Panama, is now before the Senate for ratification.

The project of uniting the two oceans by a cut across the Siamese-twin ligature that unites the two great western continents and divides the two great oceans is not a new or a modern one. In 1528 a route for a canal was examined by two Flemish engineers by the orders of Philip II. of Spain, but finding insuperable difficulties the project was abandoned. The advantage of a short cut between the rich silver mines of Mexico and the home treasury were palpable and recognized by the Spanish government; but the enterprise was lacking, and the absorption of the public revenues of the kingdom by constant wars made the attempt impossible.

In England the project was revived in the latter part of the 17th century. In 1826 Domingo Lopez of New Granada explored a route for a canal 44 miles in length between Panama and Portobello. Another survey was made in 1827 under the orders of Gen. Bolivar by two English engineers, Lloyd and Falmark, who concluded their labors in 1829. The only result of their labors was proving the possibility of either a canal or railroad between Panama and Chagres.

In 1843 the French government sent out MM. Garella and Courtines to make explorations. They reported in favor of a canal passing under the dividing ridge of the Ahogayegua by a tunnel 125 feet high from water level and 17,390 feet long. With the disastrous expedition of Lieut. Strain, probably all or most of our readers are familiar. The sum of these and other explorations, having a similar object in view, has been to show the possibility, if not the feasibility, of a canal across the isthmus. Through this connecting link, however, the backbone of the great double continent stretches, and at no, as yet ascertained, point offers what is termed a "pass," a depression sufficiently depressed to admit of a canal without very heavy rock cutting. In the case of a railroad, slight and even considerable grades may be surmounted, and where the carrying of these grades is too costly a tunnel may be driven through; but a railroad tunnel scarcely twenty feet wide is possible, while one to accommodate ships, like that proposed by Garella is a feat at which even modern engineering may stand aghast. A canal, however, is proposed, and one without tunnels.

Several months ago Secretary Seward came to New York City and held a conference with some of the most enterprising business men of the city in relation to this subject, which resulted in the formation of an association with Mr. Peter Cooper at its head, intended, if the reports were favorable, to be organized into a company. Returning to Washington Mr. Seward sent Mr. Cushman to Bogota, and the result is a treaty by which the republic of Colombia concedes to the United States the exclusive right to construct an inter-oceanic canal across the Isthmus of Darien at any point which may be selected by the United States. The Colombian government cedes six miles of land on each side of the canal, one half for its own benefit and the other for that of the party undertaking the construction of the work. The Colombian government is to receive ten per cent of the net income for the first ten years, and the canal is paid for twenty-five per cent of the net profits. The treaty is to be ratified by the United States within ten months.

We ascertain from Mr. Cooper that the entire length of the proposed canal will not exceed thirty miles, with a good harbor at each terminus and only about seven miles of rock cutting. There are several points on either shore which may be selected, but none have yet been decided upon. Whether either of those already surveyed will be selected or a new survey made, is not yet determined. We are assured, however, that upon the ratification of the treaty, measures will at once be taken to begin what will, when completed, be the greatest work, in importance, of this century.

HORTICULTURAL PROTECTION.

The sole ground upon which the modern patent systems of our own and other countries stand, is the right of the inventor to share more largely than any other individual in the benefits of his invention. The world at large may enjoy to any extent the fruit of his labors, but it must reward him for the benefits he has conferred upon it. Such reward is not a gift but the wages of his toil. He has earned, and is therefore entitled to it. The principle upon which copyrights are given to authors is the same. There is, however, a class, who conferring most substantial benefits upon the public, are yet unprotected in their rights to compel those using the results of their labors to make them an adequate return. We allude to horticulturists.

That they might no longer be deprived of protection, a committee of ten were appointed by the Lake Shore Grape Growers Association to draw up and present a memorial to Congress, which was accordingly done in December 1868, praying that letters patent might be granted on new horticultural varieties, and that purchasers of said varieties be allowed to propagate for their individual use only, during the time of the right granted, and that a gift of plants propagated from said variety by any other excepting the originator, be considered a breach of law similar to that of a sale.

This was opposed by Mr. P. Barry, in a letter to the *Rural New Yorker*, Jan. 9th, 1869, who asserts that by the nature of the case, the originators of new varieties are already sufficiently well protected, and that the determination of the patentability of a variety would be impracticable. He asks, "Who would be the judge as to whether an article would be worthy of a patent? I have known people to claim old and well-known fruit as seedlings. I have known instances, I might say by thousands, of people supposing they had produced or discovered a valuable fruit, when, in fact, it was utterly worthless."

Now, as Mr. Barry is himself a horticulturist, and has shown by the paragraph just quoted that *he* is able to discriminate between good and bad, and old and new, we respectfully submit that he is himself a competent judge as to whether an article would be worthy of a patent, and we make no doubt that when the United States desires to obtain a competent examiner for this department, numerous applicants equally as well qualified will be forthcoming.

Mr. Barry regards it as being in the power of the originator of a valuable species to propagate it at once largely, and thus to secure the benefit of his discovery by large sales at the outset. Now it has often been, within our personal knowledge, that new varieties have been obtained by surreptitious means, and when the originator supposed himself ready to enter the market, after large expense and trouble, he has found himself anticipated by others and his hopes of profit suddenly blasted. Many such men, are unable from lack of means, to widely disseminate a new variety until some unscrupulous and wealthy nurseryman has been able to scour the field, thus robbing him of his reward with perfect impunity.

It is also contended that the granting of patents to this class of claimants would retard the introduction of new varieties to some extent, and this is regarded as being a strong argument against the proposed plan. We admit that the granting of patent rights and copyrights does retard the general seizure and appropriation of the fruits of other men's toil; in this respect it is like the laws imposing penalties for theft, highway robbery, and burglary. As well might a man propose the expurgation of all these laws from our statute books, as to adduce such an argument against the justice of protecting a class of earnest workers who are contributing so much to the welfare of mankind as horticulturists.

People are not generally aware how long and arduously a man must work in this field before he arrives at a result worth perpetuating; what numberless experiments must be peformed; what years of anxious waiting and constant care must elapse before he can hope to secure any reward; what endless and trying disappointments lie between him and the goal he would reach.

We believe the enactments of the law desired by the petitioners a matter of simple right and justice, and we are pleased to learn that the committee to which the bill was referred has reported favorably upon it. Now let Congress act upon it speedily and put an end to the system of "grab," which has hitherto been the course which the public has pursued towards this important and numerous class of benefactors.

We believe no man uninfluenced by mercenary motives can view this question in any other light than one of simple and common justice. The stimulus which would be given by such a law to the origination of choice varieties to take the place of those which have run out, would be prodigious, and would confer incalculable benefit, not only upon a worthy and industrious class of people but upon the country at large.

COLORING OF MARBLE AND OTHER BUILDING STONES.---A NEW PROCESS.

The coloring of marble has been practiced a long time, but heretofore its results have not been altogether satisfactory. It has always been considered a difficult process, and the piece of marble to be colored required great care in its selection, that it might be free from spots or veins. Heat, to open the pores of the stone so as to prepare the stone to receive the colors, has been considered essential. It is true that many of the colors used would strike into the texture of marble while cold, but they would not sink to a desirable depth and the color remained upon the surface.

The colors required and the vehicles employed to convey them to the stone have been numerous and various. Horses or dogs' urine with lime and potash, lye from wood ashes, alcohol, oily liquors, spirits of turpentine, and wine, are menstruums which have given some of the best results. The coloring matters used have been drawn from the animal, vegetable, and mineral kingdoms. Among them may be enumerated, extracts of saffron, buckthorn berries, alkanet root, dragons' blood, logwood, cochineal, gamboge, vermillion, yellow prussiate of potash, etc., etc.

The art of marble staining has been generally kept a secret by those who have achieved the greatest success in it, and has proved a lucrative employment.

We have said that the results attained have not proved en-

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tirely satisfactory. Either the colors have proved fugitive or changeable after a time, so as to impair the effect of the combinations in which they were placed, or the stone would not bear polishing after the process, or was only a surface color, liable to wear out when used for floors, steps, or in other situations whereit was liable to attrition.

The superior advantages of a method which should impregnate the entire mass, as much in the interior as the exterior, and before polishing as well as after, are too obvious to be dwelt upon.

Such a process is claimed by Dr. J. A. Weisse, of this city, who has for a long time been experimenting in this field. We have not been put in possession of the details of this process, but we are able, from personal observation, to testify as to the results obtained. The stones are colored through and through, not only marble but even granite having been subjected to the process with entire success. We are informed that the process is based upon the discovery of a new mordant, which has such an attraction for stone that when a large block has only its base immersed in the solution, it will in a short time become permeated through the entiremass, increasing its specific gravity, and filling its pores so that the absorption of water is rendered very much less when subsequently exposed to the weather, than previous to the operation. When it is remembered that the absorption of water, and its subsequent expansion by frost is one of the greatest causes of disintegration in our climate, it will at once be seen that an important collateral gain is obtained by the new process. Marbles colored by this process in the rough, afterward take a most beautiful polish, and specimens of dolomite polished previous to coloring have their polish hightened by it.

An effort has been made in this process to imitate the means by which the valuable colored building stones naturally receive their color. No attempt is made to produce a given pattern, or to imitate any particular effect. The general tone of the color is produced and the variations of the tints are determined by the structure of the stone itself. In this way the effects are all natural. We have before us a piece of marble picked up in a common marble yard, of a cheap variety, one side polished the other rough, which has been colored by this process, and which the best judges invariably pronounce to be genuine Sienna marble.

The colors produced include the entire range of tints, and the veins and spots which develop themselves in marble, which previous to the operation is pure white, are surprising and beautiful. The cheapest grades of stone are thus rendered ornamental and desirable, and the combinations rendered possible by this discovery must arrest the attention of architects. We do not exaggerate when we say that some of the most excellent specimens of natural stones, celebrated for their beauty, seem dull in their colors when placed by the side of those prepared by this process. Their adaptation to church architecture, as well as the adornment of private dwellings, will be admitted by all who inspect them.

MANUFACTURE OF ARTILLERY POWDER IN ENGLAND.

The manufacture of this powder has hitherto taken place in the Royal Laboratory, Woolwich, and in comparatively small quantities; arrangements will, however, soon be perfected at Waltham Abbey, which will admit of its supply to any reasonable amount. The ingredients of gunpowder are sulphur, saltpeter, and charcoal. These undergo various processes of refinement, and are then mixed in definite proportions, and incorporated in a mill for several hours. At the conclusion of this operation the mixture is termed "mill cake," and has all the properties of gunpowder. In order to convert "mill cake" into granulated powder, it is necessary to pass the cake through a breaking-down machine, which crushes up all the large pieces, and reduces the powder to the form of "meal," in which condition it can easily pass between the plates in the subsequent process of pressing. The powder having arrived at this stage, is ready either for granulation or being converted into pellets. To be granulated, it passesfrom the breaking-down machine to the press; is there converted into "press cake," which is subsequently broken up by other machines into whatever size of grain is required. For pellets the "meal" is slightly damped with water to give the required hardness; the amount of moisture being about five per cent. It is then spread out on a molding plate, fitted with a number of small molds, each about one and one-fourth inches deep, so as to contain just sufficient "meal" to form a single pellet. The hydraulic piston, fitted with corresponding stops, then descends and presses the powder into the form of pellets. The next operation is drying, and the pellets are subsequently drummed, so as to round the edges, which otherwise might break off in transport and render the powder dusty. When completed, the pellets are in the form of disks, each being almost the size of a sixpence, and about half an inch thick, with a small cavity stamped in one face. They weigh from 85 to 95 grains, and their density is about 1·68 as compared with water.

The chief advantages expected to result from the employment of pellet powder may be enumerated as follows:—(1) Decrease of pressure in the gun; (2) greater uniformity in velocity; (3) less waste in manufacture, as the powder does not require granulation.

The introduction of pellet powder is of too recent a date to enable us to speak positively of its cost of manufacture as compared with ordinary powder. It is, however, clear that we must have a large description of gunpowder; and the question yet remaining to be solved is, whether it is cheaper to make this in the form of pellets or of a very large grained powder. The process of manufacture is the same for both up to the stage of "meal;" and as the production of pellets is attended with no waste, all the "meal being used up, we are inclined to believe that in the long run it will prove a cheaper article than a granulated powder, which yields a comparatively small amount of finished powder from an equal weight of cake, although the first cost for machinery may be greater in the case of pellet manufacture. Pellet powder is somewhat weaker than our ordinary rifle L. G., and experiments have given the proportions in the following table:

Gun.	Charge.	Nature of Powder.	Weight of Projectile.	Initial Velocity.	Remarks.
	lbs.		lbs.	feet.	
12-inch rifled	70	ordinary	600	1,212	A short gun in comparison with its caliber.
Ditto	67	ordinary	600	1,180	
Ditto	76	Pellet	600	1,189	
11-inch rifled	70	ordinary	530	1,255	
Ditto	76	Pellet	530	1,220	
10-inch rifled	60	ordinary	400	1,290	
Ditto	64	Pellet	400	1,300	
8-inch rifled	43	ordinary	250	1,340	
Ditto	45	Pellet	250	1,340	

In 1865–6 the Russian government instituted a series of experiments which resulted in the adoption of prismatic powder for their heavy ordnance. The Russian experiments were chiefly carried on by means of Rodman's pressure piston, and the results appeared to show—1. That the use of elongated cartridges is attended by a considerable reduction of pressure. 2. That with a proportional charge and diameter of cartridge, the pressure increases with the caliber or size of bore—that is to say, the same proportions which gave a pressure represented by 2,800 atmospheres in a gun of 6-inch caliber, gave 3,000 atmospheres in an 8-inch caliber. 3. The initial pressure of prismatic powder is considerably less than that of ordinary powder. Thus in an experiment with the 8-inch B. L. rifled gun, firing shot of 174 pounds English, the initial pressures were said to be as 1 to 2 when the velocities of the shot at the muzzle were equal. On the whole, however, it was found that a larger charge of prismatic had to be used to give the same velocity as ordinary powder, and the cost per round was thus increased about 15 per cent, although the actual price of the prismatic powder was only one halfpenny per pound more than the ordinary.

The Russian prismatic powder is chiefly made at Ochta, and undergoes a process somewhat similar to that followed in the case of the pellet. The broken down "mill cake" is first converted into an irregularly-rounded granular powder, the size of the grains varying from one-thirteenth to one-eighth of an inch in diameter. It then receives an addition of about 7 per cent of water, and is pressed into hexagonal prisms with a force of about 2,160 pounds per square inch, each prism containing 7 holes. On issuing from this press the prisms are of sufficient density and hardness to bear any ordinary handling. The next operation is the drying process; the prisms are removed to a lofty chamber heated with hot air to the temperature of about 100 Fah.; there, arranged on shelves, they are dried for about a fortnight, by which the moisture is reduced from 7 to less than 1 per cent. The powder is then considered fit for use, and is packed in cartridges of the required size. Care is taken in packing these cartridges to fit the hexagons evenly together so that the holes with which they are perforated may run parallel to the axis of the cartridge; the latter is made of cotton cloth or silk of such a size that the hexagonal prisms are all bound tightly together. The dimensions of each prism are as follows: Diagonally, 1·55 in.; faces, 0·77 in.; depth, 0·96 in. Seven holes of 0·2 in. diameter, arranged at a distance of 0·4 in. from centre to center; density, 1·66; weight, when dried, 660 grains. The prismatic powder lately adopted by Prussia is, we believe, similar to that tried in Russia.

IMPROVEMENTS IN ENAMELING IRON WARE.

The *Ironmonger* contains the following account of the improvements which have been made in this important branch of industry:

"Since the first introduction of this manufacture, now more than twenty years ago, and originating, if we are not in error, in Staffordshire, very considerable improvements have been made, both in the quality of the glassy covering and in the thinness and evenness of its application, and the force of adherence given to it, as applied upon the metallic surface, whether of cast or wrought iron. At first the coating was very thick, not far short of an eighth of an inch, very rough, and mammillated, far from free from minute cracks, and becoming discolored with rapidity over the fire, and quickly acted upon with acids, such as are used even in cookery. In fact, the glaze was a very fusible glass, so rich in lead and oxide of tin, and the temperature of application was so low, that adhesion was imperfect.

"Some promising improvements have been comparatively recently made, but unfortunately only partially described. M. Ballouhey has described (in 'Wagner's Jahres-bericht,' 1868) his method of enameling cast and wrought iron. The enameling, or glazing, by known methods of cast and wrought iron has been now for some time introduced, and the applied process consists in covering the previously well-cleaned surface of the metal when strongly heated with an easily fusible enamel or glass in the state of fine powder, so as to melt it upon the metallic surface, or burning-in the laid-on enamel or glass in a muffle or oven, whereby generally a better adherence is produced. A mixture of strongly basic silicates is used, so that this enamel cover cannot be very durable, but is easily affected by acid and saline liquids. In order to protect the iron in a more durable and complete manner, M. Ballouhey proposes a process quite different from this usual one. He brings the surface of the metal, which is provided with a protecting covering, in contact with a mixture of such substances as are used for the manufacture of ordinary white glass, and then heats the whole till the temperature of vitrifaction is reached. The iron in this case oxidizes superficially. The produced oxide of iron, probably having chiefly the composition of 'forge scales,' combines with the silicic acid of the glass, and an iron glass sub-coat of silicate of iron is obtained, which forms with the metal beneath one body. This protecting cover may be made either thin or thick; it is, however, preferable to make it only very thin, because it will then better resist inequalities of expansion without cracking or scaling off. Trials are said to have been made to glaze, according to this method, iron plates to be used for covering iron-built vessels, in order to protect the iron against the influence of the air and sea-water, and against the attacks of marine molluscs and the growth of plants.

"Now, although we are disposed to believe this last method embraces a real advance in enameling of iron, we are not so sure about the continued adhesion of the glaze; and, in any case, we pronounce the imagined application of such enameled sheets to the sheathing of iron-built ships a perfect delusion. The ingenious thought of so modifying the nature of the glaze, that the high heat needed to flux it shall superficially cover the previously cleaned face of the iron with an excessively thin coat of black oxide before the glaze has had time to melt, and the employment of a glass of such a nature as shall seize upon the outer face of this thin *parenchyme* of oxide, and convert it partially into silicate, so that, as a result, this coat shall act as a *tertium quid*, and a solder, in fact, between the metallic iron and the external glass of the glaze, is very probably found not difficult to realize. But the final success in producing a really durable enamel on a metal plate depends upon the fulfillment of one or other of two conditions: Either the glaze must be more or less flexible and *extensible* in all directions, so as to give with the expansion and contraction of the metal—just as the japan coating does upon an iron tea-tray; or glaze the must have a co-efficient of expansion within the range of temperature to which the enameled article is to be exposed, precisely the same as that of the metal, iron, or cast iron, etc., which it covers. Precisely, we say, for the extensibility of any glass of whatsoever composition is so small, so nearly insensible, in fact, that unless so, the cracking, and finally parting company of the glaze from the metal surface is only a matter of a short time and the degree of change of temperature undergone.

"Now, this will not be nullified by any more effectual soldering of the glaze to the face of the metal, by a thin interposed film of forge scale oxide, which, perhaps, passes insensibly, though through a very shallow range in depth of the iron, from ($FeO+Fe_2O_3$) on the outside to metallic iron in the interior, and from a basic glass of earthy and alkaline bases outside all, into silicate of iron, and of earthy bases at the junction with the glaze. Let the glaze itself expand more or less than does the iron, and it must and will split off sooner or later. The coating of glaze, if it cannot get loose at the metallic face, will do so in some stratum above that, slitting through the silicate of iron, or the glaze itself somewhere, and in planes more or less approximating to those of the iron plate.

"The first condition for success, then, in improving this manufacture, is to be found in the production of a glaze of exactly equal co-efficient of expansion with the iron; and for this end nothing would suffice, or be so rapid in yielding practical fruit, as a train of exact experiments upon the expansion of long rods of enamel of various, but known, composition, all being of such a nature as otherwise to permit their being fused on to iron. The material once obtained as respects this point, adhesion might be procured from glasses of probably very various composition, and from others than such basic glasses as require the production of the coat of oxide on the iron, or silicates of iron as the cementing intercoat. But yet it seems to us that this silicate of iron coat promises well, and would be advisably kept to. The main difficulty in every case, hitherto, has been to get the glazed coating fused and spread, without so far oxidizing the iron, by the prolonged and high heat to which it is exposed, that when again cold, the coating shall not fall off, bringing a thin scale of oxide of iron along with it.

"Now, it appears to us that this might be almost completely avoided, and all difficulty as to oxidization of the iron avoided, and just as much or as little oxidization as we require given to it, by burning-on the glaze in one of Siemen's gas furnaces. We can there employ a pure, oxidizing, neutral, or a deoxidizing flame to heat up and nearly bring to the fusing point the material spread on the iron for the glaze; when the latter approaches incipient fusion, we can use the oxidizing flame, and so just get that extremely thin film of *hammerschlag*, or black oxide (like that on the surface of the sheets of fine Russian sheet iron of commerce) which we here want. Or possibly, sheets already oxidated up to that point might be put at once into such a furnace, and by a pure neutral flame the glaze be burnt on, *i. e*, fused and caused to adhere.

"Many useful applications for this ware, were it once perfect as a manufacture, might be found. For lining the interior of water pipes and cisterns, it was proposed and tried in this country before 1852, but failed because the necessary conditions for durable enamel did not exist. Upon the outer surface of thin iron roofing tiles it may be a valuable addition, and might enable iron slating or tiling to be used in damp countries as well as at present in dry ones, and with the advantage of having brilliant and party col ration through the enamel given to the tiling. So far no real use has been made of enameled iron ware but for culinary or like vessels, and the manufacture of these in France and Belgium, as the Exhibition at Paris of last year showed, yields a far better and handsomer product than ours in England.

"Enameled cast-iron name plates, or single letters, for streets, etc., were proposed at least thirty years ago, or even earlier, and have been employed greatly in Germany and

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France, and to some extent in Great Britain. So far as our observation goes, they have nowhere proved permanent; frost and oxidation are rival destroying agents. Wherever such enameled iron plates are to be seen, after some years of exposure, they are more or less defaced.

"The labels of the streets of Paris, we believe, are lettered upon plates of porcelain.

"The application of glass-faced plates, however, to sheathing ships is perfectly Utopian. Ships' iron sheathing, like that of copper or its alloys, must not only sustain more or less fully the chemical action of the sea-water and air, but the mechanical friction of the water when the ship moves, and all the violent and constant accidental abrasions to which its surface is subject in the navigating of every ship. Enameled iron cannot do either; and as to fouling, the glazing itself is a first-rate *nidus* for the deposit of marine vegetable and animal organisms, quite as good, if not better, than the coat of rust, which is the usual and indispensable forerunner of fouling. If iron ships are not to be sheathed with certain suitable copper alloys (copper alone is most suitable), insulated by wood from the iron body of the ship, then sheath with wood alone; but whatever is to be employed, enameled iron ought not to be."

APPLICATIONS BEFORE CONGRESS FOR THE EXTENSION OF PATENTS.

LIST OF CASES PENDING BEFORE THE SENATE.

O. F. Winchester, President of "The Winchester Repeating Arms Co," for an act to authorize the Commissioner of Patents to receive an application for the extension of the letters patent of that company. Committee on Patents report a bill granting relief asked for.

Stephen R. Parkhurst, for the extension of his patent for ginning cotton and burring wool. No action.

Martha M. Jones, widow and administratrix of Samuel T. Jones, deceased, for the confirmation of a patent which was granted February 23, 1866, for the manufacture of the white oxide of zinc. Committee recommended an amendment to House Bill.

Jeremiah Carhart, extension of his patent for improvements in reed musical instruments, such as melodeons, parlor organs, etc., and that Congress confirm the reissued patent of Aug. 18, 1857. Action suspended.

Mrs. George B. Simpson, for compensation for use by the Government of the invention by her husband, known as the sub-marine telegraph cable. Reported adversely.

A bill for the relief of Saml. Peirce. (Curved oven plates). Reported adversely.

Samuel A. Miller, extension of his patent for an improved compound anchor. Reported favorably.

Thomas Crossley, to be authorized to make application for an extension of his patent—the time having expired in which such application should have been made according to law—machines for printing woolen and other goods. Reported favorably.

E. M. Chaffee, extension of his patent for his discovery of a process for grinding india-rubber. Reported adversely.

Richard M. Hoe, extension of his patent for an improvement in printing machines. Case reported for action of the Senate without recommendation.

Edward D. Tippett, praying an appropriation to enable him to complete his invention for perpetual motion.

Jonathan S. Turner, extension of his patent for an improvement in alarm clocks. Favorable report.

A Bill to extend the letters patent, originally granted to John Young, washing machine. Reported without amendment and recommend passage.

A bill to extend the patent granted to G. S. Blodgett and P. T. Sweet, for oven for baking, for seven years. Pending.

Memorial of Mahlon Loomis, praying an appropriation to enable him to demonstrate his discovery of telegraphing. Committee asked to be discharged.

Alpheus C. Gallahue, extension of his patent for an improvement in machines for pegging boots and shoes. Favorable action, and bill reported and passed.

Christian Sharp, extension of his patent for a breach-loading rifle. Pending.

A bill for the relief of George Fowler, and the estate of De Grasse Fowler, deceased, or their assignees. Pending.

A bill for the relief of Isabella C. Youngs, wife of Theophilus Youngs. (For "an improvement in surface condensers for steam engines"). Pending.

A bill for the relief of Wright Duryea. ("Card Exhibitor"). Reported favorably.

The following additional applications for extension are pending before the House Committee on Patents:

John J. Weeks, for improvement in harvesters.

Jonathan and George W. Prescott, for stuffing for mattresses.

Harrison M. Brown and William E. Bassett, for grain and hay harvesters.

Horace S. Emery, for improvement in the endless chain horse power.

Robert Burns Goodyear, improvement in power looms.

Mrs. Elizabeth N. Jackson, for the annunciator.

Fred. M. Norcross, for planing machines.

Mrs. Catharine Bourshell, for improvement in railroad car wheels.

Elias Howe, Jun., for sewing machines.

William S. Chapman, for improvement to prevent the rattling in carriages called the "anti-rattler."

Samuel Gardner, for machinery for crushing ores, pulverizing, and stamping.

John Murphy, for improvement in processes in treating gutta-percha.

S. N. Marsh, for extension of patent on truss.

Horace Smith and D. B. Wesson, improvement in firearms.

Anson Atwood, improvement in railroad car wheels.

J. Atkins, improvement on rakes to grain harvesters.

Reuben Comins, improvement in railroad bridges.

John Chilcott and Henry Ward Beecher, for improvement in the cutting out of boots.

A. Clark, for fastening forks upon the handles.

William Trapp, improvement in barrel machinery.

Henry Jenks, improvement in the process of manufacturing wire grating.

Josiah Copeland and J. M. Read, for an improvement in boot crimps.

WE learn that a fog-whistle, to be worked by a 10-horse power engine, is being constructed for Thatcher's Island, off Salem, Mass. It will be ready by the 1st of June. This will be the largest and most powerful fog-whistle in the world.

Editorial Summary.

UNDERGROUND RAILROAD.—A company has been organized in London to tunnel from the Post Office to the marble arch entrance on Hyde Park. Mr. Hawkshaw, the engineer of the proposed line, states that it shall be constructed without any interruption of the street traffic between the hours of six in the morning and ten at night. Any diggings made during the night will be covered in, and the paving replaced before six in the morning. The trains are to be drawn by wire ropes from fixed engines at each end, so that the air of the tunnel will not be poisoned by the smoke and vapors of locomotives; and, as there can be no collisions, trains will start every two minutes. In the opinion of competent engineers, the substitution of locomotives for ropes was a mistake, whether regarded from the scientific or the economic point of view. The proposed new tunnel road will have nine stations, and the estimated cost is seven million dollars. Improved means of communication in cities is one of the greatest necessities of the day. We want, if possible, to get rid of the surface roads.

THE STEAMER PEREIRE.—The salvation of the French steamer *Pereire* from utter destruction upon the occasion of the accident in the recent attempted voyage from Havre to New York, seems little less than a miracle. On January 20th she encountered a tremendous hurricane, and at about two o'clock on the following afternoon, an immense wave "formed of about seven hundred tuns of water, fell like an avalanche on the deck." Twenty-four out of the thirty-six furnaces were extinguished, four persons were killed, and twenty-one seriously injured. Some of the fatal accidents took place on deck. One young lady was killed while reading in the saloon—the water struck her on the back of the neck, and broke the spinal column." That the steamer was saved and brought back to port after shipping this immense wave, speaks volumes for the staunchness of her construction.

GOOD TESTIMONY.—W. Haddon Marriott, of Baltimore, writes us as follows: "When I reached home this evening I was agreeably surprised to find awaiting me my letters patent, which upon examination I find to be in every *particular* satisfactory, and therefore, I must tender you my sincere thanks for the promptness, *uprightness*, and *thorough ability* which you have shown in executing the trust confided to you. I shall not only recommend you to such of my friends as need your invaluable advice and assistance, but shall deem it a *privilege* to be able to point them to *honest, upright* men, so rare now-a-days, who will not betray their confidence. To show *my* confidence in you, I am about to place in your hands another, I think, far more valuable case, trusting to your justly given and undisputed ability."

PAINTING ZINC.—A difficulty is often experienced in causing oil colors to adhere to sheet zinc. Boettger recommends the employment of a mordant, so to speak, of the following composition: One part of chloride of copper, 1 of nitrate of copper, and 1 of sal-ammoniac, are to be dissolved in 64 parts of water, to which solution is to be added 1 part of commercial hydrochloric acid. The sheets of zinc are to be brushed over with this liquid, which gives them a deep black color; in the course of from 12 to 24 hours they become dry, and to their now dirty gray surface a coat of any oil color will firmly adhere. Some sheets of zinc prepared in this way, and afterwards painted, have been found to entirely withstand all the atmospheric changes of winter and summer.

COPPER SMOKE.—The smoke from the copper-smelting works of Swansea, Wales, has long been a nuisance to the neighborhood, and the frequent occasion of litigation. Mr. Vivian, one of the principal owners, has at length devised a plan for condensing the sulphureous vapors, thereby converting them into oil of vitriol. This discovery will restore to agriculture thousands of acres of land which the noxious vapors have rendered sterile, and will relive the inhabitants of the murky cloud which has nearly smothered them. The oil of vitriol thus manufactured will be useful in the preparation of the compounds necessary to redeem the land from the unfruitful state into which it has fallen.

TWO lads of this city, aged respectively 8 and 10 years, who recently mounted the cow-catcher of the locomotive Leonard W. Jerome, intending to take a short ride along the Eleventh avenue, supposing the engine would stop after moving a short distance, were carried to Peekskill, forty miles away. They were in a position where the engineer could not see them, and upon their arrival at Peekskill, one of them fell off upon the ground senseless, and the other was too weak to walk. After being cared for, the boys were returned to this city. We venture to say they will hereafter give the cow-catcher a wide berth.

TREMPER'S VELOCIPEDE.—In another column we publish the illustration and description of the above velocipede. The inventor says he is 69 years old and that he can "ride his machine an hour or two with a good walking motion, reading the SCIENTIFIC AMERICAN, with comfort, and turn inside a circle four feet diameter, steering with one foot only. The machine can be used as a one-wheeled velocipede; that is, with the rider over the driving wheel and the hind wheels used only as steadiers."

THE contrast between the mildness of the winter in the United States and elsewhere, and the violence of the storms at sea, is attracting attention. Is there any connection between these phenomena? If any other than the universal law of compensation throughout all the operations of nature, what is it?

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

W. W., of Ontario, Ca.—Vulcanized rubber may be softened by heat, so as to become plastic.

A. J. R., of Mich.—We cannot give time to the solution of such problems as you send us; you should apply to an hydraulic engineer.

H. F. S., of La.—The use of a weak solution of ammonia in the water will be found useful in removing the odors caused by perspiration.

M. L. B., Ill.—We have not heard of any proposition made to Congress for an appropriation to aid in the development of a system of telegraphing without wires. The best work on heat you can get is Prof. John Tyndall's. "Heat considered as a Mode of Motion."

D. B. K., of R. I.—We know of no work on "rosette turning," or the engraving engine. H. C. Baird, 406 Walnut st. Philadelphia, Pa., or D. Van Nostrand, corner of John st. and Broadway, New York, may accommodate you.

F. H. B., of ———answers the question of "T. K., of Mich." on page 124, current volume, as to how many pounds will be required to depress eight springs etc. by "one pound only."

A. P. W., of Ill., asks the rule for determining the relative resistance of a steel plate of a given thickness and one composed of many layers but of the same aggregate thickness. As the word "resistance" is of a general and not a specific significance, and he does not say whether the resistance is against pressure, percussion, torsion, extension, or otherwise, we cannot reply to his question. Why cannot inquirers write what they mean?

C. O. H., of Iowa.—"What number of revolutions should I run a 24-inch circular saw cutting oak into stove wood?" 9,000 feet per minute is a good general rule for the speed of the periphery of circular saws. At this rate your case would stand thus in round numbers: 9,000 divided by 6 feet, circumference of saw, equals 1,500, number of revolutions of saw per minute.

H. M. C., of Wis.—Copper and brass may be coated with zinc by boiling them in a solution of sal-ammoniac with zinc turnings.

J. R., of Mass.—Cotton may be detected in linen as follows: Immerse a piece of the suspected tissue in boiling solution of hydrate of potash and water contained in a glass or porcelain capsule, equal parts by weight, for three minutes, then remove it and dry between blotting paper; the cotton threads will show either white or very light yellow, while the linen fibers will be a dark yellow; a small lens will aid in the examination.

B. M. R., of Va.—Plumbago or "black lead" as it is sometimes called is a compound of iron and carbon, not an oxide of iron as you suppose. It is the best material for lessening friction between wooden surfaces where oil is not admissible, and is generally used by piano makers and tuners for that purpose.

B. M. G., of Mo.—Portable glue is made by adding one part of brown sugar, by weight, to two parts of good glue in solution straining and cutting into pieces while yet soft. It is much more soluble than the common glue, and is useful for many purposes, as fastening paper to drawing boards, etc.

R. T. McM., of Del.—Mock ivory may be made by mixing isinglass and strong brandy into a paste with finely powdered eggshells. It should be cast in molds previously well oiled, and be left to dry. It is said to resemble real ivory when hard.

E. E., of Indiana.—Dross is the oxide which forms upon the surface of metals when melting, often mixed with other impurities. Zinc when deposited on the surface of iron in the process of galvanizing assumes the crystalline appearance of which you speak. Sal ammoniac is the name of the salt, used by tinsmiths in soldering and in tinning iron.

C. F. B., of N. Y.—The strength of malleable cast iron and wrought iron, vary with the perfection of the methods employed in their manufacture, and the quality of the iron. Malleable cast iron often approximates closely in strength to wrought iron. Its strength also varies with the size of the casting. As a rule small sized castings have the greatest tensile strength. You will see therefore that an exact ratio of strength between these materials cannot be established.

J. P. McG., of Tenn.—The complete deodorization of coal oil, has not yet been fully accomplished. Coal oil will mix with certain saline solutions, and some other hydro-carbons. The solvents of sulphate of quinia are numerous. Cold water dissolves it sparingly. Thirty parts of boiling water dissolve it entirely. Sixty parts of cold alcohol dissolve it completely. Ether dissolves it with difficulty. All, or nearly all, the dilute acids dissolve it with great facility. We believe it is also soluble to some extent in glycerin.

A. S., of Conn.—Shellac is dissolved by alcohol, muriatic, and and acetic acids. Solution of potash also dissolves it and combines with it chemically. The insect commonly called the "deathwatch" is a species of beetle, of the genus anobium. It is the larvæ of this insect that causes the sound resembling the tick of a watch; it is the sound of their mandibles as they gnaw upon the wood in which they are concealed.

R. O. S., of Ky.—A good black ink is made by the following recipe. Bruised Aleppo nutgalls 12 lbs. boiled an hour in copper, with six gallons of water, adding enough to compensate for evaporation. Strain and boil one half hour the same galls with four more gallons of water. Strain and boil the galls again with 2½ gallons of water; strain again and mix the several liquors. Now heat and add while hot 4 lbs. of coarsely pulverized copperas, 3½ lbs. of bruised gum arabac, and stir until all is dissolved. Let it settle and finally strain through a hair sieve. The addition of a little creasote or carbolic acid will prevent mold. The addition of 1 lb. of sugar will make this a good copying ink.

T. J. L., of Pa., referring to an article in a previous number of the SCIENTIFIC AMERICAN, on "Steam Igniting Combustible Substances," asks if the action of the steam is not purely mechanical, as when a jet under high pressure impinges on some easily ignitable substance, thus producing friction, consequently heat. In reply we ask "would a jet of atmospheric air under similar circumstances produce ignition?" The mechanical conditions are the same, but the heat is wanting.

P. S. B., of Mass., asks for "iron cements." We understand he desires the recipes for making cements for uniting iron, as pipes, etc. The best quick setting cement we know, may be made by mixing powdered sal ammoniac, 1 part; powdered sulphur, 2 parts; iron filings 80 parts, all by weight, with sufficient water to make a paste of the required consistency. The red lead cement for face joints is made of white and red lead, equal parts, mixed with raw linseed oil to the proper consistency.

J. P. J., of R. I.—Riveted splices of belts are much to be preferred to those secured by lacings. In the latter case the belt is more or less injured by the use of the belt awl. Always use a punch in preference to the barbarous awl.

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NEW PUBLICATIONS.

We are in receipt of the "Tribune Almanac," the "World Almanac," and the "Merchants and Bankers' Almanac." The two first are published, respectively, at the offices of the New York *Tribune* and the New York *World*, and the latter at the office of the *Bankers' Magazine* (P. O. box 4,574), New York. These annuals are replete with valuable information in their respective spheres, and are useful to those who wish to keep posted in the politics and financial condition of the country.

WHERE TO EMIGRATE AND WHY. With Maps and Illustrations. New York: Frederick B. Goodard, 432 Broome street.

This book contains information as to the climate, agricultural, and manufacturing resources of all parts of the United States. It will prove a valuable help to those who meditate the purchase of property in locations with which they have had hitherto little acquaintance. Applications must be made to the publisher.

WOODWARD'S NATIONAL ARCHITECT. Containing 1,000 Original Designs, Plans, and Details to Working Scale, for the Practical Construction of Dwelling Houses for the Country, Suburb, and Village, with Full and Complete Specifications, and an Estimate of the Cost of each Design. By George E. Woodward and Edward G. Thompson, Architects, New York. George E. Woodward, 191 Broadway.

The principal author of this handsome quarto is Mr. Geo. E. Woodward, already favorably known to the public through his previous works in rural architecture. The present work is the result of long experience and matured skill, and we can give it no higher praise than to say that the promise given on its title page is amply fulfilled. The plates are executed in the highest style of the art, and are studies which young architects will do well to supply themselves with. The work is superbly got up, and supplies a want felt by many at the present time, when the taste and demand for suburban residences is rapidly increasing. Really good designs for such structures have been scarce, as is evidenced by the want of variety, among those which can be commended, and the utter ugliness of most of them. We give the work our unqualified commendation.

ZELL'S POPULAR ENCYCLOPEDIA AND UNIVERSAL DICTIONARY. Edited by L. Colange. Philadelphia: T. Ellwood Zell, Nos. 17 and 19 South Sixth street.

The first seven numbers of this work have come to hand. It is a quarto, printed and illustrated in handsome style, and seems to be ably edited. The difficult task of condensation, has, if we may judge from the numbers before us, fallen into good hands. Its price is ten cents per number, and when completed and bound, it will prove a valuable work of reference to those who cannot afford the more expensive and complete works of the kind.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Ring saw mill, at West Bath, Me., was entirely burned up a few nights since. The *Boston Weekly Spectator* says of this mill that it occupied the site of what was probably the oldest tide mill in the country. The first saw mill was built in 1741, and was a double mill, built in the oldest style. It stood but a few years before it was destroyed by fire. The second mill was built in 1749, and is known to have stood less than fourteen years, as in 1763, a third mill was built, and still a fourth one was built on the same site in 1782, which stood twenty-four years. The fifth and last mill was built in 1806, and embraced all the then latest improvements.

The *Harrisburg* (Pa.) *Guard* says an experiment is being made with a new kind of fuel on some of the steamboats running on the Missouri river. It is a compressed coal, the process of preparing which originated in England, and is claimed to be greatly superior to common lump coal. It is now in use on board the steamships of the West India and Pacific Mail Company, and has been found to "make steam" faster, and to admit of more compact stowage than ordinary coal.

An exchange says: "Titusville, Pa., is to have a velocipede school shortly, and the oil operators are all going to take lessons, with a view to riding from well to well. They hope thereby to avoid the mulecipedes and old hossipedes formly in vogue there."

Quite a number of northern manufacturers are reported to be looking about Weldon, North Carolina, with a view of establishing factories there if the result of their examination is favorable.

Seed of the Cinchona tree, from which quinine is made, is to be distributed gratuitously by M. F. Maury, of Lexington, Va., for a trial through the mountain regions of the Southern States.

The *North American* says, "The new oil well at Franklin, which has been creating a sensation lately, has "pegged out," and is now only yielding two or three barrels daily.

The Temascal tin mine in California now gives occupation to twenty-five hands, mostly Englishmen from Cornwall, and the prospects for a rich and permanent yield are said to be in the highest degree favorable.

A Frenchman intends to try the experiment of growing poppies for the purpose of extracting opium during the coming season in Louisiana.

Crude oil is said to command from $6·50 to $6·75 per barrel at the principal points in the oil regions.

A manufacturing concern at Chicopee, Mass., makes over two hundred and seventy-five different styles of locks varying in price from twenty-five cents to one dollar.

A statement recently made to the Board of Trade, at Providence, R. I., shows that in case of fire the fire engines of that city would exhaust the water supply in three hours.

The shoe manufacturers at Bridgewater, Mass., cannot answer their orders they accumulate so fast.

A new bridge across the Allegheny river, at Brady's Bend was completed on Feb. 2d.

Cincinnati announces a combined velocipede, musical, and elocutionary entertainment.

Vermont has already commenced the production of her annual crop of maple sugar.

The paper mills at Russell and Huntington, Mass., are now running on half time.

The Texas newspapers are intending to found a mill to make their own paper.

Reports from Wisconsin state that the winter has been extremely favorable for lumbering, and large quantities have been got out.

Beturns from Louisiana make the value of the sugar manufactured in 1868 twenty millions of dollars.

The lemon and lime trees of Florida are reported to have been largely killed out by the frosts in that State. The orange trees will recover.

The travel last year between France and England was less than between Boston and New York.

The New York ice merchants, notwithstanding the mildness of the winter, have gathered a full crop, and the supply of ice for the coming summer will be abundant.

Facts for the Ladies.

I can inform any one interested of *hundreds* of Wheeler & Wilson Machines of twelve years' wear that to-day *are in better condition than one entirely new.* I have often driven one of them at a speed of eleven hundred stitches a minute. I have repaired fifteen different kinds of Sewing Machines, and I have found yours to wear better than any other. With ten years' experience in Sewing Machines of different kinds, yours has stood the greatest and the severest test for durability and simplicity. GEORGE L. CLARK.

Lyndenville, N. Y.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Crosby Patent Saw Buckle, advertised in No. 9, Vol. 20, cuts nine millions per gang, instead of five.

Pickering's Velocipede, 144 Greene st., New York.

Manufacturers of the best machine for making wagon and carriage hubs please address, stating price, etc., Postoffice Box 84 F., London, Ontario.

S. S. Pollard's celebrated mill pick, established 1837. 137 Raymond st., Brooklyn, N. Y.

Inventors' and Manufacturers' Gazette—An illustrated journal of new inventions and manufactures. February number now out. Cheapest paper in the world. $1 per year. Sample copies sent. Address Saltiel & Co., Postoffice box 448, New York City, or 37 Park Row.

Great inducements to manufacturers of small machinery. License granted for a royalty. Send for cut and description to M. V. Collins, Sherman, N. Y.

Important—Green lumber dried in two days. Also, tobacco, meal, and every substance, cheaply. Circulars free. H. G Bulkley, 135 Fulton st., New York.

True principles for oiling journals—see Wickersham's adver't.

To watchmakers and dealers in watches—Wanted, agents in every City, County, & State in America, and all parts of the globe for Arthur Wadsworth's patents. Apply to Patentee, Watch Factory, Newark, N. J.

For sale low—Three second-hand presses for punching nuts and washers, all sizes, and other work. Punches and dies for same. Address Geo. H. Hawes, Fall River, Mass.

Best Coal Tar Benzole, from Morson & Sons, London, for sale by T. Metcalf & Co., Tremont st., Boston.

Manufacturers or inventors of meat and vegetable chopping machines, address and send circulars to Phil. Tomppert, Jr., Louisville, Ky.

Two-set knitting mill for sale—See advertisement back page.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Glynn's anti-incrustator for steam boilers—the only reliable preventive. Causes no foaming, and does not attack the metals of the boiler. Liberal terms to Agents. Address M. A. Glynn & Co., 735 Broadway, New York.

W. J. T.—We think the patent asbestos roofing manufactured by H. W. Johns, of this city, is the best substitute for tin or slate. It is cheap and easily applied.

Inventors and patentees wishing to get small, light articles manufactured for them in German silver or brass, address Schofield Brothers, Plainville, Mass.

Tempered steel spiral springs. John Chatillon, 91 and 93 Cliff st., New York.

Two saw mills for sale. C. Bridgman, St. Cloud, Minn.

Rockwood, 839 Broadway, N. Y., photographs architectural or mechanical drawings and plans to a scale. Also, photographs of machinery.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Change Gear-wheel Tables.—See Walter & Son's advertisement.

Punching and shearing machines. Doty Manufacturing Co., Janesville, Wis.

Specialties in the Machinists' line. Parties desiring work of a special character address S. W. Gardiner, 6 Alling st., Newark, N. J.

"The greatest attraction in the Mechanics' Hall, at the New York State Fair, was the wonderful scroll saw exhibited by J. W. Mount." —See New York Times, Oct. 16, 1868. All who are interested in scroll saws should address the exhibitor at Medina Iron Works Medina, N. Y.

Ericsson's Caloric Engines.—Where a light, safe, economical power is required, these engines—of late greatly improved in construction as well as reduced in price—answer an admirable purpose. Apply to James A. Robinson, 164 Duane st., New York.

Responsible and practical engineers pronounce the Tupper Grate Bar the best in use. Send for a pamphlet. L. B. Tupper, 120 West st., N.Y.

Iron.—W. D. McGowan, iron broker, 73 Water st., Pittsburgh, Pa.

N. C. Stiles' pat. punching and drop presses, Middletown, Ct.

Winans' boiler powder, N. Y., removes and prevents incrustations without injury or foaming; 12 years in use. Beware of imitations.

The paper that meets the eye of all the leading manufacturers throughout the United States—The Boston Bulletin. $4 a year.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

FAUCET FOR FILLING BARRELS.—S. C. Catlin, Cleveland, Ohio.—This invention relates to a new and improved faucet for filling barrels with liquids from tanks or reservoirs.

MOSQUITO-NET FRAME.—U. W. Armstrong, Evansville, Ind.—This invention relates to an improvement in constructing frames for supporting mosquito-nets, and consists in the method of uniting the horizontal rods to the uprights of the frame.

STEAM HAMMER.—Alexander Miller, Racine, Wis.—This invention relates to an improvement in steam power hammers, whereby all guides and slides are dispensed with.

FLOOD GATES.—John J. Kimball, Napierville, Ill.—This invention relates to a new and useful improvement in gates for controlling the flow of water.

APPLE CORER AND CUTTER.—C. D. Read, Lowell, Mass.—This invention relates to a new and improved machine for coring and cutting apples whereby much time and labor is saved; and this invention consists, in attaching to a central coring tube a number of cutting knives radiating from its center, and also in a sliding spindle operating centrally therewith.

CHURN.—Robert Murphy, Jasper, N. Y.—This invention is an improvement on that for which letters patent were issued bearing date July 5th, 1864, in which the cover of the churn was provided with a rim at its lower end, which, while closing the seam between the cover and body of the churn, also served the purpose of a hoop. The present improvement consists in placing in the lower end of the cover a circular flange, and in making a corresponding groove in the upper end of the body of the churn, so that when the cover is placed in position its flange shall fit within the said groove and make a tight joint.

TUBULAR BOLT.—David F. Fetter, New York city.—This invention has for its object to furnish a bolt in which a large proportion of metal may be utilized, while it will be fully as strong as those heretofore employed. The invention consists in making the bolts hollow, so that they are lighter, cheaper, and still as strong as the solid bolts heretofore used.

POTATO SORTER.—Lewis Perrine and Peter G. Conover, Freehold, N. J.—This invention relates to a machine for sorting potatoes in the field, and in other places; and it consists of a hollow cylinder with open ends, and open, slatted, or perforated sides, so arranged that the same may be revolved by hand, or otherwise, with the meshes or apertures through the sides sufficiently large to allow the smaller potatoes to pass through the orifices, while the larger potatoes will pass through the cylinder and be discharged from its end.

REEFING THE COURSES OF LOWER SAILS OF SQUARE-RIGGED VESSELS.—Nathaniel Ingersol, Salem, Mass.—The object of this invention is to provide a simple and practicable means for reducing or reefing the "courses," so-called, of lower sails of a square-rigged vessel.

CONNECTING ARTIFICIAL TEETH TO BASE OR PALATE PLATES.—Henry Crane, D. D. S., New York city.—This invention has for its object to furnish a simple, convenient, effective, and reliable mode of connecting artificial teeth to base or palate plates.

ATTACHMENT FOR STEAM HEATERS.—Almon N. Allen, Pittsfield, Mass.—This invention has for its object to furnish an improved means for moistening the air of rooms heated by steam, so as to remove the dryness of the air of said rooms and make them more comfortable and healthful, and, at the same time, prevent the shrinkage of the wood work of the room.

CORN AND COTTON SEED PLANTERS.—R. R. McGregor, Covington, Tenn.—This invention has for its object to furnish a simple, convenient, and reliable machine for planting corn and cotton seed, which shall be so constructed and arranged that it may be easily adjusted to plant corn or cotton seed, and which will do its work accurately and well in either capacity.

IRON OR STEEL COLUMNS.—George Walters and Thomas Shaffer, Phoenixville, Pa.—This invention has for its object to furnish an improved column of great strength and rigidity, and which shall, at the same time, be easily and conveniently constructed and put together, and which may be made of any desired size and style.

MACHINE FOR POLISHING THREAD.—Samuel and Robert A. Semple, Mt. Holly, N. J.—This invention has for its object the construction of a machine for polishing sewing thread, and consists in the application of rapidly revolving reels carrying grooved felted brush, or smooth rollers or bars, to the action of which the thread is subjected while being fed from the bobbin reel to the spindles on which it is to be wound.

MEDICAL COMPOUND.—J. W. M. Kirkpatrick, Hamburg, Arkansas.—This invention consists in the combination of several ingredients, whereby an effective specific for the treatment of fever and ague is obtained.

OSCILLATING STEAM ENGINE.—L. Andersen, Chebanse, Ill.—This invention relates to improvements in oscillating steam engines, the object of which is to simplify the construction of the same. It consists in the arrangement of the valve and parts.

SUBMARINE TELESCOPIC LANTERN.—Henry Thompson, Mobile, Ala.—This invention relates to improvements in submarine lanterns, the object of which is to provide a more useful lantern than any other now employed for the same purpose.

SASH FASTENER.—Wm. A. Goranflo, Allentown, Pa.—This invention relates to improvements on sash fasteners, the object of which is to provide a simple and cheap device that will readily adjust itself to act as a lock when the sash is shut down, and may be unlocked and adapted for a fastener for holding the sash at any desired point by a slight movement by the hand.

SPLITTING AND SKIVING MACHINE.—Wm. Best, Abington, Ill.—The object of this invention is to provide a simple and effective adjustable machine for splitting and skiving leather, for harness-makers' use. It consists of a grooved block, provided with a splitting knife in the usual manner, in the groove of which, under the knife, is provided an adjustable slide, which may be adjusted to split the leather in any thickness, or to split or "skive it to any desired taper.

WASHING MACHINE.—Wm. S. Todd, Mechanicsville, Iowa.—The object of this invention is to provide a simple, effective, and easily-operated washing machine. It consists of an oscillating tub or basket within, and concentric with a fixed tub; the oscillating tub being constructed with vertical and radial rubbing slats, and actuated by a lever, having a toothed segment, which engages with a pinion or smaller toothed segment mounted on the upper end of the shaft or central post of the inner tub.

CONSTRUCTION OF RAILWAY CARS.—B. P. Power and John Coyne, Baltimore, Md.—The object of this invention is to obtain a railway car which cannot be easily crushed or destroyed by running off the track, or set on fire by any accident.

DUMPING WAGON AND CAR.—Thos. H. Gary, Bristol, Md.—This invention relates to that class of wagon bodies and cars, which can be tilted so as to dump the load in the rear; and the improvement consists in a new apparatus by which the wagon or car can be operated more easily than heretofore.

BINDING ATTACHMENT FOR REAPERS.—Wm. De C. May, Baltimore, Md. This invention has for its object the construction of an apparatus, which shall automatically receive the gavel from the sickle, place a wire band around it, tie the band, sever the wire, and drop the gavel upon the ground or into a box provided for the purpose; and to that end the invention consists in a simpler, lighter, less expensive, and more perfectly operating apparatus, than has heretofore been brought into use for the same purpose.

GAS STOVE.—Wm. C. Trowbridge, New York city.—This invention relates to certain improvements on that kind of gas stove in which heated hydrocarbon liquids are consumed. The invention consists, first, in a new arrangement of pipes for conducting the oil to the flame, with an object of collecting impurities and sediments, before the oil or the vapors reach the small orifice of the burner. In the apparatus now in use, this orifice is frequently clogged by the impurities of the oil, and the effectiveness of the stove thereby impaired. The invention also consists in constructing the stove of open work for the purpose of admitting air, to facilitate perfect combustion.

SHEET METAL BALUSTERS FOR ROOFS, BALCONIES, ETC.—Geo. Fischer, New York city.—This invention relates to a new manner of making the metallic metallic balusters which are used on roofs, balcony-rails, etc., and which were heretofore made of cast metal, as it was found too expensive to form the separate moldings from strips of sheet metal, and as furthermore in the latter case the joints, where the ends of the several strips were soldered, could not be successfully concealed. The present invention consists in forming sheet metal balusters by spinning the same in several parts from plates, and by connecting the several parts in a suitable manner. Thereby the finest specimens can be produced in absolute purity, no joints being on on the sides, and no flaws from imperfect casting, marring the beauty of the design.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

36.—BREECH-LOADING FIREARMS.—Sam'l Remington, Ilion, N. Y. January 5, 1869.

38.—IMPROVED MACHINE FOR PLAITING AND DIVIDING TEXTILE FABRICS.—J. Stevens, Orange, N. J. January 5, 1869.

32.—DISTILLATION OF HYDROCARBON OILS.—C. Hall, Smith's Ferry, Penn. January 5, 1869.

83.—BOXES, ETC., FROM PAPER PULP, AND APPARATUS EMPLOYED THEREIN.—R. Smith, Shelbrooke, Canada. January 11, 1869.

90.—WATER METER.—G. Sickels and J. H. Thorndike, Boston, Mass. January 12, 1869.

92.—KNITTING MACHINERY.—William Franz and William Pope, Crestline Ohio. January 12, 1869.

101.—ELASTIC RUBBER.—L. Sterne, New York city, J. A. Jacques and J. A. Fanshawe, Tottenham, England. January 13, 1869.

175.—WHEELS FOR RAILWAY CARRIAGES, LOCOMOTIVES, AND OTHER VEHICLES.—John Raddin, Lynn, Mass. January 19, 1869.

32.—DISTILLATION OF HYDROCARBON OILS.—Charles Hall, Smith's Ferry Pa. January 5, 1869.

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83.—MANUFACTURE OF BOXES, ETC., FROM PAPER PULP, AND MACHINERY THEREFOR.—Richard Smith, Shelbrooke, Canada. January 11, 1869.

90.—WATER METER.—G. Sickels and J. H. Thorndike, Boston, Mass. January 12, 1869.

90.—KNITTING MACHINERY.—Wm. Franz and Wm. Pope, Crestline, Ohio. January 12, 1869.

101.—ELASTIC RUBBERS.—L. Sterne, New York city, and J. A. Jaques and J. A. Fanshawe, Tottenham, England, January 13, 1869.

175.—WHEELS FOR VEHICLES.—John Raddin, Lynn, Mass. January 19, 1869.

114.—REAPING AND MOWING MACHINERY.—Cyrenus Wheeler, Jr., Auburn, N. Y. January 14, 1869.

115.—STOP MOTION AND REGULATOR FOR STEAM PUMPS.—C. S. Westland, Providence, R. I. January 14, 1869.

129.—FASTENER FOR DOORS AND WINDOWS.—John Dickinson, New York city. January 15, 1869.

171.—MODE OF AND APPARATUS OR MECHANISM FOR DRIVING PILES.—P. S. Justice, Philadelphia, Pa. January 19, 1869.

186.—MANUFACTURE OF ILLUMINATING GAS AND OF SPONGE, AND FURNACES FOR MELTING SAID SPONGE AND OTHER METALS.—John Absterdam, New York city. January 20, 1869.

222.—FOR THE MANUFACTURE OF VARIOUS USEFUL OR ORNAMENTAL ARTICLES.—J. M. Merrick, Jr., Massachusetts, U. S. January 25, 1869.

235.—CENTRIFUGAL MACHINES FOR DRAINING SUGARS AND OTHER SUBSTANCES—H. W. Lafferty and Robert Lafferty, Gloucester, N. J. January 25, 1869.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING FEBRUARY 16, 1869.

Reported Officially for the Scientific American.

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Patents and Patent Claims.—*The number of patents issued weekly having become so great, with a probability of a continual increase, has decided us to publish, in future, other and more interesting matter in place of the Claims. The Claims have occupied from three to four pages a week, and are believed to be of interest to only a comparative few of our readers. The publication of the names of patentees, and title of their inventions, will be continued; and, also, as heretofore, a brief description of the most important inventions. We have made such arrangements that we are not only prepared to furnish copies of Claims, but full Specifications at the annexed prices:*

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Full information, as to price of drawings, in each case, may be had by addressing

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86,896.—PLOW.—J. Bader, Sr., Perrysburg, Ohio.

86,897.—CHAIR FOR COUPLING RAILWAY RAILS.—H. L. Beach, Montrose, Pa.

86,898.—WASHING FLUID.—James Bell, Sonora, Cal.

86,899.—INVALID CHAIR.—A. P. Blunt, and Jacob S. Smith, Washington, D. C.

86,900.—REIN HOLDER.—A. T. Boon and L. Mills, Galesburg, Ill. Antedated Jan. 1, 1869.

86,901.—SECRETARY BEDSTEAD.—E. E. Briggs and M. G. Briggs, Boston, Mass.

86,902.—HOOK FOR TACKLE BLOCKS.—Wm. Carter, Philadelphia, Pa.

86,903.—STEAM DRILL.—G. F. Case (assignor to himself and "The Windsor Manufacturing Company"), Windsor, Vt.

86,904.—HARVESTER RAKE.—H. J. Case (assignor to himself, W. H. Stevenson, and S. D. Wackman), Auburn, N. Y.

86,905.—CULTIVATOR.—M. Caywood and J. Caywood, Peoria county, Ill.

86,906.—VELOCIPEDE.—J. C. Clime (assignor to himself and Wm. Audorf), Philadelphia, Pa.

86,907.—COMBINED OVEN AND STOVEPIPE DRUM.—John W. Clough, Montville, Me.

86,908.—PERMUTATION LOCK.—S. L. Cole and Wm. G. Ayres (assignors to themselves and H. W. Colver), Brooklyn, N. Y.

86,909.—FASTENING FOR BEDSTEADS.—A. S. Dalbey, Richmond, Ind.

86,910.—HOOP SKIRT.—T. D. Day, New York city.

86,911.—FASTENING FOR SHEET METAL.—T. J. Diedrich and F. Diedrichs, Philadelphia, Pa.

86,912.—MACHINE FOR CROZING STAVES.—H. Elliott (assignor to himself and Amos A. Stevens), Boston, assignors to H. Elliott and J. Sherman, Jr., Farmington, Mass.

86,913.—BEEHIVE.—G. J. Flansburgh, Bethlehem, N. Y.

86,914.—MACHINE FOR MAKING NUTS.—G. H. Fuller, Unionville, Conn.

86,915.—BEEHIVE.—J. C. Gaston, Cincinnati, Ohio.

86,916.—SPRING-BED BOTTOM.—J. C. Gaston, Cincinnati, Ohio.

86,917.—MATERIAL FOR THE MANUFACTURE OF PAPER.—J. J. Gillet-Damitte, H. D. Dubois, and A. Boissonneau, Paris, France.

86,918.—WASH BOILER.—J. Green, New York city.

86,919.—GAME COUNTER.—A. A. Griffing, Lexington, Mass.

86,920.—BUSK FOR CORSETS.—E. Heaton, New Haven, Conn. Antedated Feb. 3, 1869.

86,921.—COMPOSITION FOR WAX FLOWERS AND FRUIT.—A. A. Hinkley, Boston, Mass.

86,922.—DENTAL JAW BRACE.—George Hill Hurd, Memphis, Tenn.

86,923.—GRIDIRON.—G. B. Isham, Burlington, Vt. Antedated Jan. 20, 1869.

86,924.—FARM FENCE.—W. Jasper, Columbia, Ohio.

86,925.—GRAIN SPOUT.—G. H. Johnson (assignor to himself and G. W. Tifft, Sons, and Company), Buffalo, N. Y.

86,926.—ELEVATOR LEG.—G. H. Johnson (assignor to himself and G. W. Tifft, Sons, and Company), Buffalo, N. Y.

86,927.—ELEVATOR LEG.—G. H. Johnson (assignor to himself and G. W. Tifft, Sons, and Company), Buffalo, N. Y.

86,928.—OPERATING DISCHARGE VALVES FOR GRAIN BINS.—G. H. Johnson (assignor to himself and G. W. Tifft, Sons, and Company), Buffalo, N. Y.

86,929.—BUILDING BRICK OR HOLLOW BLOCK.—G. H. Johnson and G. Milsom, Buffalo, N. Y.

86,930.—RAILROAD SWITCH.—C. W. Jones, Philadelphia, Pa. Antedated Feb. 1, 1869.

86,931.—WINDING RACHET FOR TIME-PIECES.—W. H. Lamb, San Francisco, Cal.

86,932.—BRICK ELEVATOR.—T. Mann, San Francisco, Cal. Antedated Feb. 1, 1869.

86,933.—CURTAIN FIXTURE.—Moses S. Marshall, Somerville, Mass., assignor to Boston Champion Fixture Company.

86,934.—HORSE HAY FORK.—N. F. Mathewson, Barrington, R. I.

86,935.—METALLIC FENCE POST.—W. A. Middleton, Harrisburgh, Pa.

86,936.—SASH LOCK.—J. W. Moffitt, Harrisburgh, Pa.

86,937.—CAR AXLE.—Henry Mooers, Toledo, Ohio.

86,938.—CLIP FOR HARNESS TRACES.—J. D. S. Newell, Tensas parish, assignor to himself and D. B. Penn., New Orleans, La.

86,939.—PROCESS OF EXTRACTING THE COLORING MATTER OF MADDER.—A. Paraf (assignor to Julius Gerson), New York city.

86,940.—BASE-BURNING STOVE.—J. S. Perry, Albany, N. Y.

86,941.—CORN PLANTER.—G. W. Phillips and B. C. Richardson (assignors to themselves and S. H. Seaman), Oconomowoc, Wis. Antedated Feb. 11, 1869.

86,942.—GRAIN SEPARATOR.—F. W. Robinson, Richmond, Ind.

86,943.—STOVEPIPE DAMPER.—David Sanders (assignor to H. Mallory), Milwaukee, Wis.

86,944.—PROCESS OF TREATING IRON AND STEEL.—E. Savage, West Meriden, Conn. Antedated Jan. 30, 1869.

86,945.—SAW SET AND PUNCH.—H. Schauer, Allegheny City, Pa.

86,946.—SHUTTER WORKER.—C. W. Shattuck, Fitchburgh, Mass.

86,947.—DITCHING PLOW.—I. S. Sheets, Troy, Ohio.

86,948.—APPARATUS AND PROCESS OF EVAPORATING LIQUIDS.—J. J. Sherman, Albany, N. Y.

86,949.—FLUID METER.—G. Sickels, Boston, Mass.

86,950.—COMBINED SEEDING MACHINE AND CULTIVATOR.—M. D. Smith, Independence, Iowa.

86,951.—MANURE DRAG.—J. S. Spangler, D. Madlem, and H. D. Spangler, Ephrata, Pa.

86,952.—REVENUE AND POSTAGE STAMP.—C. F. Steel, New York city.

86,953.—FEEDING MECHANISM FOR CARDING MACHINE.—B. W. Tangee, Woodville, R. I. Antedated January 30, 1869.

86,954.—FEEDING MECHANISM FOR CARDING MACHINES.—B. W. Tangee, Dorrville, R. I.

86,955.—ATTACHING HEELS TO BOOTS.—C. D. Ulmer, Boston, Mass.

86,956.—BORING FAUCET.—A. Weed, Boston, Mass.

86,957.—TREADLE FOR SEWING MACHINES.—Anna Weissenborn, New York city.

86,958.—BOOT AND SHOE SHAVE.—Walter Wilbur (assignor to himself and Sylvester F. Root), New Salem, Mass.

86,959.—CARRIAGE AXLE.—John F. Wilbur and True Tuttle, Pownal, Me.

86,960.—LAWN MOWER.—Maximilian S. G. Wilde, Somerville, assignor to himself and James H. Noble, Pittsfield, Mass.

86,961.—CASTING BUILDING BLOCKS.—John D. Wise (assignor to himself and Charles Diebold), German township, Ohio.

86,962.—COMPOUND FOR THE MANUFACTURE OF ARTIFICIAL MARBLE.—Job Abbott, Canton, Ohio, administrator of the estate of Wilhelm Meyer, deceased.

86,963.—MANUFACTURE OF ARTIFICIAL MARBLE.—Job Abbott, Canton, Ohio, administrator of the estate of Wilhelm Meyer, deceased.

86,964.—STEAM HEATER.—Almon N. Allen, Pittsfield, Mass.

86,965.—STEAM ENGINE.—L. Andersen, Chebanse, Ill.

86,966.—MOSQUITO NET FRAME.—U. W. Armstrong, Evansville, Ind.

86,967.—WRENCH.—John N. Arvin, Valparaiso, Ind.

86,968.—TYPE BREAKER.—Charles Baer (assignor to himself and Philip Heinrichs), New York city.

86,969.—SPLITTING AND SKIVING MACHINE.—William Best, Abingdon, Ill.

86,970.—SELF-CLOSING FAUCET FOR FILLING BARRELS.—S. C. Catlin, Cleveland, Ohio. Antedated February 8, 1869.

86,971.—BREECH-LOADING FIREARM.—Isaiah B. Conklin, Baltimore, Md.

86,972.—MODE OF CONNECTING ARTIFICIAL TEETH WITH DENTAL PLATES.—Henry Crane, New York city.

86,973.—YARN GUIDE AND CLEARER.—A. C. Dakin, Clinton, and J. D. Butler, Lancaster, Mass. Antedated February 6, 1869.

86,974.—STEAM ENGINE.—J. M. Davidson, Napoleon, Ark.

86,975.—WEATHER STRIP FOR WINDOWS.—Andrew Jackson Devoe, Hackensack, N. J.

86,976.—HOLLOW BOLT.—David F. Fetter, M. D., New York city.

86,977.—CONSTRUCTION OF SHEET-METAL BALUSTERS.—George Fischer, New York city.

86,978.—SPRING BUT.—Theodore Fredericks, Newark, N. J.

86,979.—DUMPING WAGON.—Thomas H. Gary, Bristol, Md.

86,980.—EXPLOSIVE COMPOUND.—Edwin Gomez, New York city.

86,981.—DEVICE FOR OPENING AND CLOSING DOUBLE DOORS.—George Carver Gooch and Thomas Buckland Jeffery, Chicago, Ill.

86,982.—SASH HOLDER.—Wm. A. Goranflo, Allentown, Pa.

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87,087.—MACHINE FOR COATING CLOTH WITH INDIA-RUBBER AND OTHER SUBSTANCES.—G. S. Dwight, New York city.

REISSUES.

73,309.—FIRE-PROOF SAFE.—Dated January 14, 1868; reissue 3,298.—E. D. Draper, Hopedale, and E. W. Glover, Medford, Mass.

83,070.—PACKING CAN.—Dated October 13, 1868; reissue, 3,299.—N. P. Lindergreen, Boston, Mass.

54,382.—SOLUTION FOR PREVENTING COMBUSTION.—Dated May 1, 1866; reissue 3,300.—J. McGill, Boston, Mass.

82,744.—RAILWAY RAIL JOINT.—Dated October 6, 1868; reissue 3,301.—E. G. Paterson, Pithole City, Pa.

75,206.—RAIL FOR RAILWAYS.—Dated March 3, 1868; reissue 3,302.—P. Pettebone, Wyoming, and J. E. Patterson and A. W. Brown, Wilkesbarre, assignees of E. R. Shepard, Scranton, Pa.

16,318.—HORSE RAKE.—Dated December 23, 1856; reissue 3,303.—A. R. Reese, Phillipsburg, N. J., assignee of J. J. Squire.

39,235.—ROCK DRILL.—Dated July 14, 1863; reissue 3,304.—A. J. Severance, Middlebury, Vt., assignee by mesne assignments, of R. Leschot.

80,516.—FEED-WATER HEATER FOR BOILERS.—Dated July 28, 1868; reissue 3,305.—S. Stucky, New Albany, Ind.

DESIGNS.

3,367.—CENTER PIECE.—H. Berger, New York city.

3,368.—CARPET PATTERN.—Robert R. Campbell (assignor to Lowell Manufacturing Company), Lowell, Mass.

3,369.—TRADE MARK.—G. F. Gantz (assignor to G. F. Gantz and Company), New York city.

3,370.—TRADE MAPK.—H. H. Glidden and Elon P. House, Springfield, Ill.

3,371.—PRINTERS' TYPES.—J. Herriet (assignor to David W Bruce), New York city.

3,372.—LAMP CHIMNEY.—T. Houghton, Philadelphia, Pa.

3,373.—LATCH.—W. L. Humason, New Britain, Conn.

3,374.—TRADE MARK.—W. C. Hutchings, Hartford, Conn.

3,375.—ICE PITCHER.—N. Lawrence (assignor to Reed and Barton), Taunton, Mass.

3,376.—SHEET-METAL CAN.—C. Pratt, New York city.

3,377.—PUMP.—H. H. Babcock, Watertown, N. Y.

3,378 and 3,379.—FLOOR OIL CLOTH PATTERN.—H. Christie, Morrisania, N. Y., assignor to W. M. Brasher and Company Two Patents.

3,380.—LAMP CHIMNEY.—G. W. Fry, Pittsburgh, Pa.

3,381.—SATCHEL LOCK.—D. Neumann, New York city.

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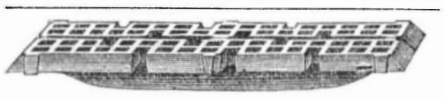

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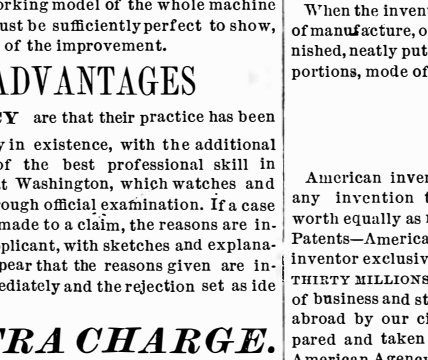

OUR SUPERIOR OROIDE WATCHES having recently been imitated, and worthless Watches sold in New York, Boston, Chicago, and other cities, represented as our Watches, we hereby caution the public against them, and give notice that we are in no way responsible for these bogus concerns, and only those purchasing directly from us can secure a genuine Watch of our manufacture. We have recently greatly improved ous Oroide in appearance and durability; and, to protect the public from imposition hereafter, have named it the "COLLINS' METAL;" and we give notice that any one making use of this name will be prosecuted to the extent of the law.

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U. S. PATENT OFFICE,
Washington, D. C., Feb. 4, 1869.

M. M. Rhodes and J. C. Rhodes, of Taunton, Mass., having petitioned for the extension of a patent granted them on the 8th day of May, 1855, for an improvement in Machine for Leathering Tacks, it is ordered that said petition be heard at this office on the 26th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 4th, 1869.

T. A. Luptor, of Winchester, Va., having petitioned for the extension of a patent granted him on the 8th day of May, 1855, and reissued on the 23d day of October, 1866, for an improvement in Grain Harvesters, it is ordered that said petition be heard at this office on the 26th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 6, 1869.

E. M. Stevens, J. B. Crosby, and J. W. Pearson, of Boston, Mass., having petitioned for the extension of a patent granted them on the 22d day of May 1855, for an improvement in Seed Planters, it is ordered that said petition be heard at this office on the 3d day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 8th, 1869.

John M. Heck, of Holyoke, Mass., having petitioned for the extension of a patent granted him on the 15th day of May, 1855, for an improvement in Dressing Sewing Thread, it is ordered that said petition be heard at this office on the 26th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 11, 1869.

George W. Hildreth, of Lockport, N. Y., having petitioned for the extension of a patent granted to him on the 19th of June, 1855, and reissued on the 1st day of May, 1860, for an improvement in Mode of Hanging Bells, it is ordered that said petition be heard at this office on the 24th day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Feb. 12, 1869.

Charles A. Durgin, of New York city, having petitioned for the extension of a patent granted him on the 22d day of May, 1855, for an improvement in Sewing Machines, it is ordered that said petition be heard at this office on the 3d day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 13, 1869.

Sarah J. Stimpson, of Baltimore, Md., executrix of the estate of James H. Stimpson, deceased, having petitioned for the extension of a patent granted to the said James H. Stimpson on the 15th day of May, 1855, for an improvement in Butter Coolers, it is ordered that said petition be heard at this office on the 26th day of April next.

Any person may expose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 13th, 1869.

Thomas J. Silsby, of Boston, Mass., administrator of the estate of Arad Woodworth, 3d, deceased, having petitioned for the extension of a patent granted the said Arad Woodworth, 3d, on the 15th day of May, 1855, for an improvement in Machinery for Spinning, it is ordered that said petition be heard at this office on the 26th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
Washington, D. C., Feb. 13, 1869.

Thomas J. Knapp, of Philadelphia, Pa., having petitioned for the extension of a patent granted to him on the 15th day of May, 1855, for an improvement in Adjustable Tenoning Tool, it is ordered that said petition be heard at this office on the 26th day of April next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE,
WASHINGTON, D. C., Feb. 15, 1869.

Jacob A. Conover, of New York city, having petitioned for the extension a patent granted to him on the 15th day May, 1855, for an improvement in Machine for Splitting Wood, it is ordered that said petition be heard at this office on the 3d day of May next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing.

ELISHA FOOTE, Commissioner of Patents.

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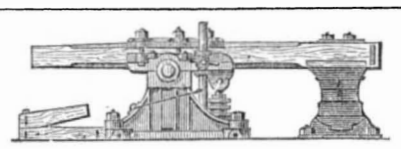

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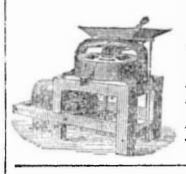

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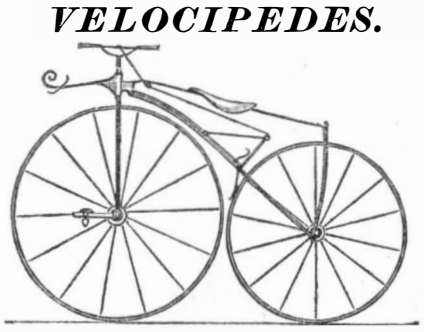

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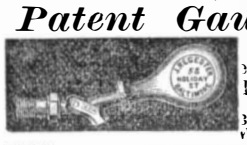

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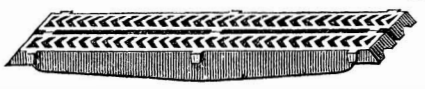

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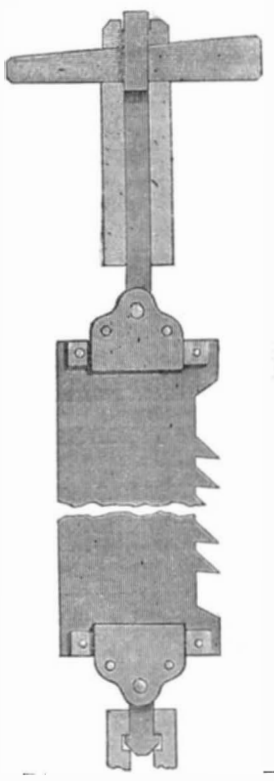

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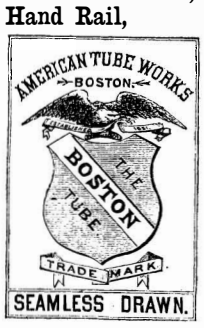

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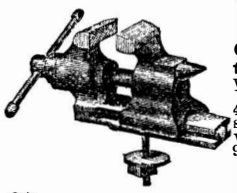

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